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**SPATIO-TEMPORAL ANALYSIS OF THE PREVALENCE
OF WATERBORNE DISEASES IN KWARA STATE, NIGERIA.**

BY

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FACULTY OF SCIENCE
AHMADU BELLO UNIVERSITY, ZARIA
NIGERIA.**

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TITLE PAGE

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BY

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**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY,
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DEPARTMENT OF GEOGRAPHY

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AHMADU BELLO UNIVERSITY, ZARIA

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APRIL, 2015

Declaration

I declare that the work in this dissertation entitled “Spatio-Temporal Analysis of the Prevalence of Waterborne Diseases in Kwara State” has been carried out by me in the Department of Geography. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

AKANBI, Oluwatoyin Adewuyi

Signature

Date

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Abstract

Waterborne diseases have been a major health issue globally because of the burden it places on man. As a result of this, the present study therefore aimed at analysing the spatio-temporal pattern of waterborne diseases, using Kwara State as a case study. Primary and secondary data were obtained from questionnaire survey, Focus Group Discussions, interviews and published and unpublished works. Multi-stage sampling method was adopted in this study. Four stage sampling method was adopted in the selection of sample size. National Population Commission (1991) estimated that the mean household for each settlement in Kwara State (as at 1991 population census) was 4.7 for the selected settlements. In all, a total of 353 households were sampled across the three senatorial districts. Kwara South Senatorial district has the highest number of households of 127, while Kwara North and Central Senatorial districts have 118 and 108 respectively. Data from FGDs, in-depth interviews, questionnaire and other sources were subjected to test the stated hypotheses using t-test, Analysis of Variance (ANOVA) and Correlation Analysis. Thus, t-test was used to establish the relationship in the mean sex perception of waterborne diseases in the study area. With $t_{cal} = 3.6732 > t_{0.05, \infty} = 1.96$ and $0.0341 < 0.05$, there was a significant difference in the mean sex perception of waterborne diseases examined in the study area. Similarly, ANOVA was used to establish the relationship in the mean perception of waterborne diseases among other socio-demographic variables such as age, income and educational qualification in the study area. The result showed that, there is a significant relationship between the examined waterborne diseases and socio-demographic variables in the study area, as $f_{cal} = 4.765 > f_{0.05, (3, 559)} = 2.62$ and $0.0356 < 0.05$. Descriptive Statistics was equally used to determine the Perception on the Prevalence of the six waterborne diseases across the three senatorial districts of the study area. The result showed that there is no difference in the prevalence and occurrence of waterborne diseases in Kwara state. Lastly, Correlation Analysis was also used to establish the relationship in the prevalence and occurrence of waterborne diseases in the senatorial districts of the study area. The result showed that in Kwara North, there is prevalence of waterborne diseases, than in Kwara South and Central. This trend may be associated to the level of self-help in Kwara South and availability of water infrastructure at Kwara Central, being the seat of government. The study concluded that, available potable water in the study is not adequate, and the few that are available are dysfunctional as the value of p-value of $.008 < 0.05$ level of significance at a correlation level of 0.530 at 22 df.. This may be closely related to the challenges of retardiness of socio-economic sector, which has led to inaccessibility to safe water . In the light of the above, the study recommended that prioritization of potable water, early tracking of waterborne diseases, efficient socio-economic programmes and relevant environmental education are necessary are imperative in curtailing the menace of waterborne diseases not only in the study area, but Nigeria as a whole.

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Acronyms and Abbreviations.

ADB	African Development Bank.
ANOVA	Analysis of Variance
CDC	Centre for Disease Control.
DFFRI	Directorate for Food and Rural Infrastructure.
FAO	Food and Agricultural Organization.
FBOs	Faith Based Organizations.
FGDs	Focus Group Discussions.
FGN	Federal Government of Nigeria.
GDP	Gross Domestic Products.
HBM	Health Belief Models.
IHSU	Integrated Health Surveillance Unit
IDI	In-depth Interview
IPP	Independent Power Plant.
ISRU	Integrated Surveillance Response Unit.
JICA	Japanese International Cooperation Agency.
KWSPC	Kwara State Planning Commission.
LGAs	Local Government Areas.
MDGs	Millennium Development Goals.

MIS	Management Information System.
NPC	National Population Commission.
UN	United Nations.
UNEP	United Nations Environmental Programmes.
UNDESA	United Nations Department of Economics and Social Affairs
UNICEF	United Nations International Children Education Funds.
USAID	United State Agency for International Development.
WATSAN	Water and Sanitation.
WBDs	Water Borne Diseases
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION.

1.1 BACKGROUND TO THE STUDY.

Waterborne diseases are a major health issue, because of the burden they place on man. Waterborne diseases are caused by pathogenic microorganisms that most commonly are transmitted in contaminated fresh water (Wikipedia, free Online). According to this school of thought, waterborne diseases may result from bathing, washing, drinking, in the preparation of food or the consumption of food thus affected. Thus waterborne diseases can be described as all illnesses that results from having contact with or drinking contaminated water. According to World Health Organization-WHO (2012a), 88.0% of all infectious diseases worldwide and 90.0% of all infectious diseases in developing countries are water-related.

Studies have shown that the prevalence of water borne diseases is associated with poor, unhealthy sanitary conditions and polluted environment (UNICEF, 2003; Parbio and Violeta, 2008). The United Nations International Children's Education Fund UNICEF- (2012) reported that, globally as at 2010 over 780million people did not have access to improved water, with 37% of them living in Sub-Saharan Africa. The same report submitted that in the same period, 2.5billion people lack access to adequate sanitation. In the same vein, Vidal (2012a) submitted further that, over 300 million Africans lacked adequate sanitary waste disposal system and clean water for drinking, cooking and washing. Indeed Jabeen, Mahmood, and Tariq (2011) opined that the second most important risk factor for poor health is lack of clean water and poor sanitation and it has major health impacts. Hunter, MacDonald and Carter (2010) also agreed that a safe, reliable, affordable, and easily accessible water supply is essential for good health.

Availability of both potable water and adequate sanitation has potential to prevent at least 9.1% of the global disease burden and 6.3% of all deaths (Pruss, Bos, Gore, and Bartram, 2012). Potable water can impact on health by preventing infectious diseases such as diarrhea and cholera, thus preventing economic loss (Fodgen, 2009). Irrespective of whether a disease is waterborne or not, diseases may have serious adverse effects on human society. According to Food and Agricultural Organization (2001), disease can impose limit to enjoyment of life, reduce labour productivity, reduce quantity and quality of food supply and generally retard socio-economic development of a people. There is a link between water, sanitation and disease in the human society (Lee, 2004). The inadequacy of water supply to households leads to unsanitary conditions, resulting in severe health problems (Ariyo and Jerome, 2004; WHO, 2005). Thus, it is not an understatement that waterborne diseases and the consequences are of concern to many stakeholders. Mismanagement of the environment can lead to pollution of the available resources including water, with its adverse effects.

The effects of waterborne diseases cannot be overemphasized. It can lead to deaths as evidenced in Nigeria recently when cholera outbreak killed many people in many states (Smith, 2010; Cebedo, 2010). This is similar to many developing countries of the world (Oguntoke, Aboderin and Bankole, 2009). The case is even worrisome in children less than five years and WHO (2012b) affirmed the mortality in this age group to be, a death of a child in every minute. Similarly, waterborne diseases can cause great economic loss, as a result of disability that may ensue which may in turn lead to disruptions in trade and travel (Yvan, Luby and Paquet, 2003).

A number of studies have confirmed reasons for the prevalence of waterborne diseases in the human society (USAID, 2005; WaterAid, 2009; NPC, 2009). Most of these reasons centered on inadequate potable water, ignorance and unsanitary attitude.

Waterborne diseases are mostly confined to areas with low hygienic facilities and poor drinking water sources. In many developing countries, sewages are poorly treated, most of which end up in the water systems. USAID (2005) asserted that waterborne diseases become prevalent as a result of dearth of potable water in many parts of developing countries. Potable water is not available in many rural areas of developing countries. Even in the urban areas, available potable water has remained inadequate hence; people obtain water from questionable sources (Aderibigbe, Awoyemi, Osagbemi, 2008). Furthermore, the prevalence of waterborne diseases has also been linked to climate change. According to Shuman (2010), climate is one of the several factors influencing the prevalence of infectious diseases in the human society. Precipitation may have effects on the prevalence of diseases, as increase in it may multiply the presence of these diseases, because heavy rains can contaminate water sheds by transporting human and animal fecal products into water sources (WHO, 2014). In a survey in Kwara State, National Population Commission (2009) showed that 64.6% of the population has access to improved sources of water, while 90.0% of the people do not have access to improved sanitation. This assertion has been affirmed by Adeoye, Adeolu and Ibrahim (2013) in a study of accessibility to potable water in Ilorin, Kwara State. Thus, the attainment of Millennium Development Goal 7 which lay emphasis on sanitation and quality water is at risk of not being met. Particularly, reducing to half, the population without potable water and sanitation facilities by 2015 may be faced with difficulties (WaterAid, 2009). This makes issue of waterborne diseases of grievous concern.

In the last ten years, the Kwara State Government has been trying to improve the access to potable water in the State through the expanded water programmes with a view to ameliorating the problems.

Despite this, a large proportion of the people still do not have access to potable water supply and thus there are indications of increase in the prevalence of various water related diseases in various locations in the State.

This study is therefore centered on the spatio-temporal analysis of the prevalence of waterborne diseases, using Kwara State as a case study.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Poor sanitary practice in Nigeria due to inadequate water supply is one of the major factors responsible for prevalence of waterborne diseases. According to the United Nations Environmental Programs (UNEP) (2000), Nigeria is one of the countries in Africa that may face water stress by 2025. In the same vein, Adeoye et al (2013) reported that, majority of the people collect their water from non-improved sources in the study area. Thus, the major challenge is provision of safe water and sanitation services which can reduce waterborne diseases in Kwara State.

Waterborne diseases can be a burden on human society, as it can retard the socio-economic development of people. Resources that are supposed to be deployed to the development of other sectors are diverted to solving epidemics, when there is an outbreak. Outbreak of waterborne diseases can also lead to agriculture shortfall, the effects of which may manifest in inadequate food supply and malnutrition.

Suffice to say that, the prevalence of waterborne diseases has been attributed to a number of factors in Kwara State. The poverty level is high, such that the disposable income cannot satisfy the need for safe water, adequate sanitation and improved standard of living.

In a survey of Kwara State by National Bureau of Statistics (2006), the poverty level for urban and rural parts stood at 95.5% and 97.3% respectively. Olusanya, Falola and Ogundeji (2011) confirmed that, poverty level in Kwara State has not changed, years thereafter. The NPC affirmed that about 50.0% of Kwarans are engaged in agriculture, which is mainly subsistence (NPC, 2009). Further worsening encouraging waterborne diseases situation in the study area is that over 52.0% of women in this state are not educated, even though the duty of sourcing water for domestics and sanitation needs in many homes in the study area lies on them.

Besides, there are other challenges that have encouraged the prevalence of these diseases in the study area. Chief among these is the problem of inadequate residential planning, which according to Olukoja, Adewusi and Ogungbenro (2013) has led to aggravation of health of the people. According to Kwara State Planning Commission (2006), majority of houses in the state were built a very long time ago and do not conform to modern safe, health and environmental requirement. Similarly, as a result of low maintenance culture, many sanitation and water facilities have broken down. For instance, Aganaba (2006) reported that of 1,851 boreholes provided by UNICEF through its Water and Sanitation Project (WATSAN) in Kwara State, 40.0% are not functioning. This is the case in developing countries where many water supply interventions do not last (Schouten and Moriarty, 2003).

Furthermore, many of the boreholes that were provided by the past administrations are either malfunctioning or in state of disrepair. A case in mind is Water and Sanitation (WATSAN) facilities provided by the Directorate of Food, Road and Rural Infrastructure (DFRRI). Available records showed that DFRRI by 1992, provided 30,000 boreholes across the length and breadth of Nigeria, but which have either broken down or are in the state of disrepair (Obasi, 2014).

Other challenges have to do with increase in population of Kwara State. Between 1991 and 2006, the population of Kwara State has increased by 800,000 people, without corresponding increase in both water and sanitation facilities.

The effect is that some of the existing water facilities are stretched and, eventually break down (Ajadi, 2010). Above all, most water facilities in the state are concentrated in the urban areas to the detriment of rural areas, which according to Oyebanji (2000) house large percentage of Kwarans.

This is not to say that the urban area of Kwara State is totally free from water crisis, as potable water is not available in adequate quantity (Aganaba, 2005; Aderibigbe et al, 2008). According to the National Population Commission (NPC, 2009), waterborne disease is a major problem in the human society. Carter Center (2014), estimated that 27 million Nigerians are infected with *Onchocerciasis* (River blindness) in different parts of 32 states. Similarly, Carter Center (2012) also affirmed that Nigeria is the most endemic country for *Schistosomiasis* (Bilharz), with an estimated 20 million people affected, who are mostly children that are affected by this waterborne disease. Furthermore, Olorok (2013) opined that cholera is a scourge that has ravaged the Nigerian communities. In the same vein UNICEF (2013) affirms that the diarrhea prevalence rate in Nigeria is 18.8%, resulting in an estimated 150,000 deaths among children under five. Adebayo (2013) submitted that an estimated 21million cases of typhoid occur yearly worldwide, resulting in 200,000 deaths in developing countries. According to Kwara State Ministry of Health (2012) cholera, typhoid, *Onchocerciasis*, *Schistosomiasis*, diarrhea and trypanosomiasis are the six major waterborne diseases in the state.

Although some isolated researches have been carried out on Kwara State in relation to health and water. For instance Aderibigbe et al (2008) worked on quality of water, its accessibility, adequacy and level of sanitation in Kwara State. A multi-stage sampling method was adopted, involving 750 respondents. It was discovered that majority had no access to daily recommended water requirement of 140 litres.

The result, in terms of quality and quantity showed that Kwara State has not met the national standard, leading to outbreak of waterborne diseases; thus the study recommended for provision of improved water. Aganaba (2006) conducted a GIS/Mapping in Kwara State on UNICEF Assisted Water and Sanitation projects and discovered that, many of the water projects were in the state of dysfunction.

This too is considered as an incentive for waterborne diseases in Kwara State to thrive. Babatimehin (2005) carried out study of Onchocerciasis in Patigi Local Government. The study adopted multi-stage sampling method, in which Patagi Local Government Area was stratified into three administrative districts. Six hundred (600) respondents were sampled in the study. The study attested to the fact that, both physical and socio-economic factors determine vulnerability to Onchocerciasis. It therefore recommended that rural development planning programmes should reflect spatial peculiarities accompanied by public enlightenment campaign on the vulnerability factors and perception of the diseases.

Abolarin, (1999) carried out research on Schistosomiasis in Kwara state. The study affirmed that, the incidence of Schistosomiasis is high among people who depend on rivers for domestic for their uses. It therefore recommended that provision of potable water for the control of not only Schistosomiasis, but other waterborne diseases.

Adeoye, et al (2013) studied the relationship between water and diseases in Kwara State. The state was divided into three zones and two Local Government Areas were selected from

each zone and two villages were selected from each Local Government Area. It was concluded that potable water remains inadequate in Kwara State, it recommended that, to prevent outbreak of waterborne diseases, provision of safe water is necessary.

However, there is no comprehensive work has been done on holistic spatial-temporal nature of waterborne diseases in the State to the best knowledge of the researcher. It is an issue that worries the mind and this is the academic gap this study intends to fill. Thus, this study is aimed at the spatial-temporal pattern of waterborne diseases, using Kwara State as a case study and this is the academic gap this study intends to fill.

1.3 RESEARCH QUESTIONS

In view of the foregoing, this study seeks to answer certain pertinent questions which are

1. What are the main waterborne diseases in Kwara State?
2. Is there a spatial variation in the prevalence of waterborne diseases in Kwara State?
3. What are the environmental factors influencing the prevalence of waterborne diseases in Kwara State?
4. What are the effects of waterborne diseases on the people of Kwara State?.

1.4 AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to analyze the spatio-temporal prevalence of water borne diseases over time in Kwara State, Nigeria. However the objectives are:

- i. identify the waterborne diseases in Kwara State.

- ii. examine the spatial pattern of selected water borne diseases over time in the State.
- iii. identify the factors that promote waterborne diseases in Kwara State.
- iv. examine the effect of waterborne diseases on the population of the state.

1.5 NULL HYPOTHESES.

H₀ I: There is no significant relationship between the mean perception of water borne diseases and demographic variables.

H₀ II: There is no significant difference between the perception on prevalence of water borne diseases and the three senatorial districts.

H₀ III: There is no significant relationship in the prevalence and occurrence of waterborne diseases in the Senatorial districts of the study area.

1.6 SCOPE OF THE STUDY

The spatial coverage of the study is limited to Kwara State, Nigeria. In order to have precision and ensure adequate representation of the sample by avoiding bias, it is stratified into three on the bases of the existing senatorial districts - Kwara North, Kwara Central and Kwara South. From the senatorial districts, two Local Government Areas (LGAs) were purposively selected. In each LGA, the existing administrative districts were also explored to access settlements. From the settlements, the household heads were estimated using National Population Commission mean estimate of 4.7.

Suffice to add that, districts were chosen and not LGA, because districts have remained unaltered over the years like LGA. For instance, Ilorin LGA's administrative structure has been altered many times over the years.

Additionally, the 1991 population census data were used, because it remains the only population document in Nigeria in recent time that disaggregates into localities.

The households were also estimated, because data were not available on each settlement that makes up the sampled settlements. The study focused specifically on issues like types of waterborne diseases, their prevalence, influencing factors, impact of these diseases on the socio-economic sector among others. It covers a period between 2007 -2012, which is a period the data were collected.

1.7 JUSTIFICATION OF THE STUDY

That waterborne disease is a cog in the wheel of progress of human society is not in doubt. It has been shown that it can retard socio-economic development of people. In the light of the above, and at the end of this study, a number of benefits will accrue from the study and some of these are highlighted:

- i. It will assist in the determination of the state of waterborne diseases infestation in the study area. Our knowledge of their prevalence will to a large extent aid the control of these diseases and necessary steps required to prevent or control them. In other words, the most common waterborne diseases in the study area can be mapped and various steps needed to stem the spread of these diseases can easily be taken. For instance, the study area is noted for certain waterborne diseases, thus the provision of potable water which is panacea for the control or total elimination of these waterborne diseases can be encouraged.
- ii. Additionally, relevant education can also be introduced to aid the control of these diseases. The importance of these can go a long way in improving social economic status of the people of the study area and Nigeria at large, hence this study.

- iii. It will also assist the government at all levels to re-evaluate its programmes on waterborne diseases with a view to determining whether such programmes have failed or succeeded.
- iv. The relevance of evaluation in any system cannot be overemphasized. First, it allows for assessment of the financial involvement vis-à-vis the structure on ground. Second, it can also be used to suggest either continuing or discontinuing a programme aimed at solving a problem. Third, it also facilitates planning for the future. Thus, the outcome of this study can assist both the government and policy makers to look at policies that are formulated in the past in relation to waterborne diseases. This may be so in this case, as it relate to waterborne diseases, from which they can conclude whether the programme has succeeded or not.
- v. This work has the potential to help in the formulation of general health policy, especially with regards to water related diseases in Nigeria as a whole.

Available studies have shown that as a result of dearth of potable water and decent sanitary system, most countries in the tropics are faced with waterborne diseases (Oguntoke et al, 2009; WaterAid, 2009; USAID, 2005). It follows therefore that knowledge that, knowledge gained in this work can form the platform upon which health policies are formulated especially in the area of provision of potable water.

CHAPTER TWO CONCEPTUAL / THEORETICAL FRAME WORK AND LITERATURE REVIEW.

2.1 Introduction

This chapter presents conceptual and theoretical frameworks, and a review of literature on water borne diseases. It is organized in parts: literature review in relation to disease perception, spatio-temporal pattern of waterborne diseases in Nigeria, environmental determinants of waterborne diseases, ecology of water borne diseases, synergy between potable water and human developments, the effects of waterborne diseases on the population.

2.2 Conceptual Framework.

Environmental changes, including more polluted water according to Ayoade (2003), have become threat to man and have fostered high incidence of diseases including waterborne diseases on humanity.

2.2.1 The Concept of Disease.

The term disease is unique to human society and it has been defined variously. For instance, a disease has been defined as a reaction of body to something that interferes with its normal functioning (Scully, 2004). When strange objects enter the human system, the tendency is that uneasiness ensues. Besides the uneasiness, the same situation can also encourage the growth of other health problems in the system. Similarly, Dorland's Medical Dictionary (2014) has also defined disease as an abnormal condition that affects the body of an organism. The abnormal condition can be associated to a number of factors, which the body is not used to. World Health Organization (WHO, 1946), in an attempt to define a diseased state, described a disease as the opposite of health.

Health according to the organization, describes the state of complete physical, mental and social well-being, not merely the absence of diseases or infirmity. In other word, in describing a disease, it must be holistic, by observing the mental, social and physical state of a person.

Central to all submissions on what constitutes a disease, certain features are pertinent about a disease and these are:-

- i) Diseases in whatever form can manifest through mental, physical or social well-being of a person.
- ii) Diseases can occur when strange objects are introduced into a system of a person. A good example that comes to mind is the consumption of contaminated food or water.

Diseases can be classified in various ways and according to a classification; two broad types of disease have been identified among human being, and these are:-

- i) Communicable diseases.
- ii) Non-Communicable diseases.

The communicable diseases are diseases that can be transferred from one person to another (Merriam-Webster, 2014). It is a result of invasion of human body by germs (bacteria, viruses, fungi, and protozoa). Examples of communicable diseases are cough, dystenry, TB, among others. Similarly, the non-communicable diseases are diseases that are opposite the communicable diseases in their occurrence. They may also be genetical in their occurrence; in other word, some of the diseases in this category may be inherited from parents.

In other cases, the disease may be a result of a person social life style. Another classification has been done by Dorland's Medical Dictionary (2014), who identified four classes of diseases. The classes are pathogenic disease, deficiency disease, hereditary disease and physiological disease. This classification opines that, Pathogenic disease is linked to diseases resulting from invasion of human body by germs. This type of disease is common in areas that has attractants to germs, which can encourage thriving of diseases. Similarly, deficiency disease is a disease that can occur from malnutrition .This is related to the socio-economic status of a person .Good example of disease in this category is kwashiorkor. Hereditary disease is disease that is inherited from either parents or from one of them. Lastly, the psychological disease is a disease that emanate from state of mind. Where people experience insecurity, in term of non-availability of social justices, certain medical problems may arise. Without recourse to further break down of other types of disease, disease can have negative effects on the well-being of a people.

WHO (2013) opined that, diseases in whatever form can lead to death. For instance, malaria kills about 4million people each year in Africa south of Sahara and the same disease has reduced economic growth in Africa by about 1.3% each year since the last 30years. Similarly, diarrhea, another known water disease is associated with unsafe water and is responsible for about 4.0% of deaths globally. Diseases can also lead to high deaths among the children, especially in the areas known for poor water (Oguntoke, Aboderin and Bankole, 2009). Diseases can lead to total economic loss, and may further plunge the people into abject poverty.

2.3 THEORETICAL FRAMEWORK

Theories offer a set of statement or frame of reference which has established relationship of how the systems work (Peter, 2007).

A number of theories have been advanced to explain the occurrence of disease in the environment of man.

According to Epstein et al (1994), 80.0% of all infectious diseases worldwide and 90% of all infectious diseases in developing countries are water related. The World Health Organization (2008) posits further that over 36,000 people die from water borne diseases in Nigeria yearly. This may partly be due to the fact that in developing countries 95.0% of their untreated sewage are discharged into surface waters (WHO, 1993), which has remained a source of domestic water to many. As a man invade natural ecosystem for the purpose of making life comfortable for himself, the environment is exposed to many dangers (Elton, 1996). Thus, the chances of increasing human infections, through emergence of new diseases, most of which have become drug resistant, which WHO (2014) claim has aided global disease outbreaks is inevitable.

Generally, the prevalence of waterborne diseases in the human society has been linked to a number of environmental factors, which according to CDC (2013) has made tracking of diseases difficult. However, Craun, Caldren and Wade (2006) submitted that transmission of diseases has complex and manifold ecological relationships and this is explained in Figure 2.1.

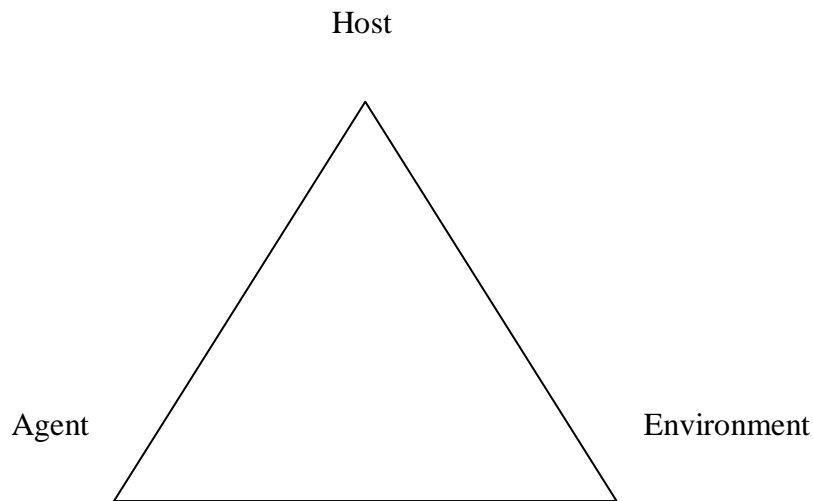


Figure 2.1: The Specific Relationship in the Transmission of Disease
Source: Craun, Caleran, and Wade (2006)

According to Craun et al (2006), the cause of diseases can be linked to the hosts, which refer to either animal or plant on which the disease lives. Furthermore, diseases can be linked to the agents (biological, chemical, or physical) that are the transmitters of a disease, while environment (temperature, sanitation, poor ventilation) can also accounts for diseases in any human society. This tally with the theory of disease ecology and human behavior in a type of ecosystem, which opined that human beings area are known to go through certain social, cultural and individual behavior in the elimination or dispersion of certain diseases (Cochran, Ewald and Cochran, 2000).

How many cases of waterborne diseases existing globally is a matter of estimates, as available statistics from aid agencies and researchers have come up with several level of prevalence. But essentially, they all conclude that waterborne diseases are a major health issue.

According to Gleick (1996) and Aderibigbe et al (2008), a normal human being requires between 2.0 and 5.0 litres of drinking safe water per day. Indeed, water supply and sanitation are the bases for development- health, education, urban and rural development, industrial progress and general economic development.

Perhaps as a result of foregoing, the world health assembly at one of its submits, recognized safe water as the foundation on which health for all evolve (WHO, 2014). Similarly, Anad (2006) and WHO (2006) submitted that because of the relevance of water and sanitation to the human society, the Millennium Development Goal listed them as MDG7, target 10. Ademiluyi and Odugbesan (2008) listed the components of the water and sanitation problems in Nigeria to include distant, unreliable sources, poor quality (contamination), and lack of safe facilities among others, all of which have its adverse effects on the family (See Fig.2.5). Some of these theoretical orientations are germane to this research and they include Traditional, Humoral, Contagion, Germ theories and John Snow theory of cholera occurrence.

2.3.1 The Health Belief Model (HBM).

Our belief system can be a modifier of our life. Such a modification may be positive or negative, depending on the use on which it is put. Health Belief Model was first developed in the 1950s in response to the failure of a free TB screening programme in the United States America. The major proponents of this model were American psychologists- Hochbaum, Rosenstock and Kegels and in their work as cited by Glanz, Rimer and Lewis, (2002) opined that the model had three assumptions and these are that:

1. Negative health conditions can be avoided.
2. By taking a recommended action, negative health condition can be assured.
3. Assurance of successful implementing health action.

The model was initially spelt out in four dimensions—Perceived threat, Perceived severity, Perceived susceptibility and Perceived barriers. Years later, the fifth dimension (Cues of action) was added to discussion on HBM. This is being further explained in Figure 2.2

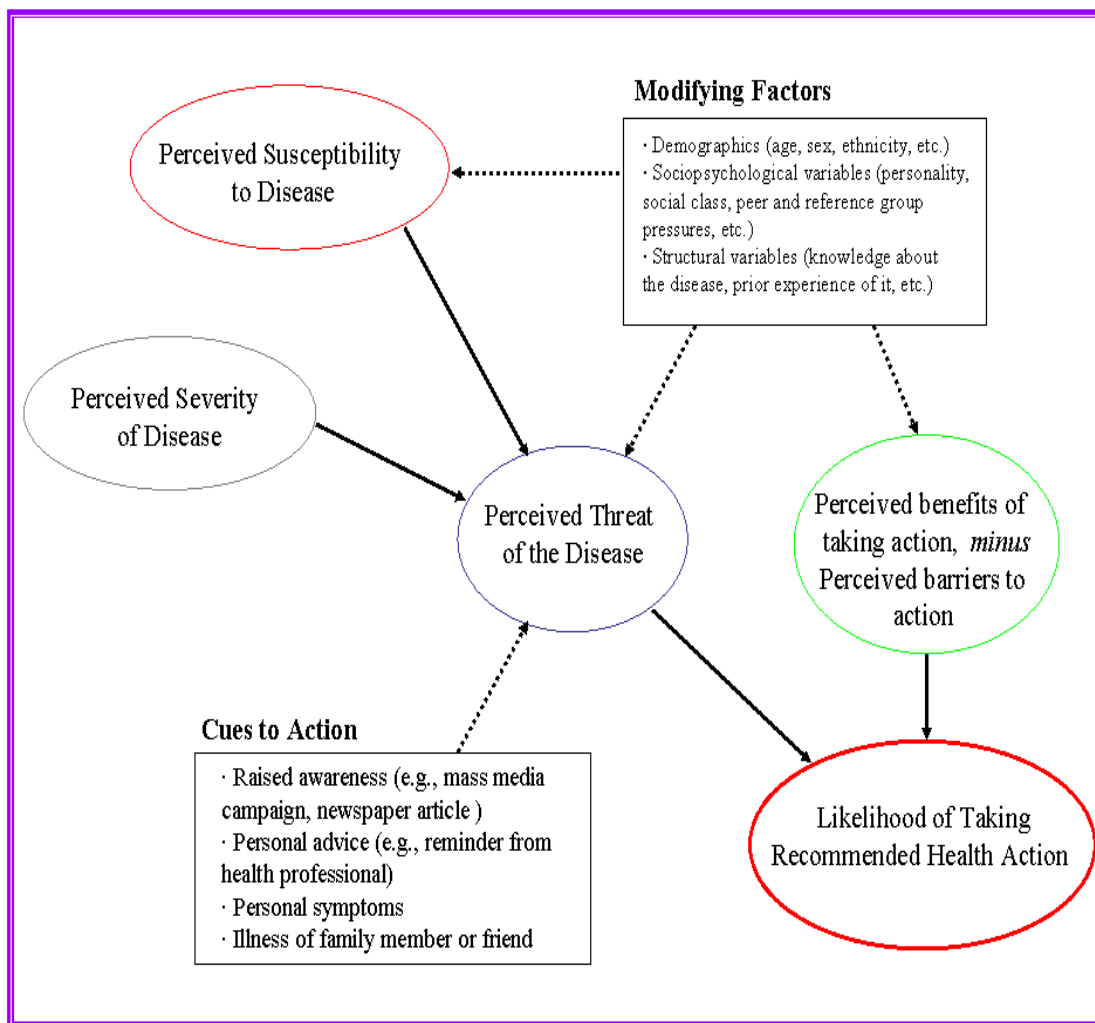


Figure 2.2: The Health Belief Model

Source:-McDowell, 2013.

According to the proponents of this model, perceived susceptibility occurs, when a person is of opinion of getting a condition. When a person is aware of being affected by a disease, the tendency is that they will be well equipped to face challenges that may arise from such. Because of the inadequate supply of potable water in Nigeria and other developing countries, people are exposed to infection of water related diseases.

While perceived severity, may occur when a person is aware of how serious a condition is and its consequences. Such diseases may result in pains, loss of working hours, and death among others. Waterborne diseases can retard progress of a society. Similarly, perceived benefits according to Glandz, Rimer and Lewis (2002) may also arise, when one is of the opinion of the efficacy of advised action to reduce the risk associated with a disease.

Availability of potable water is a panacea for waterborne diseases and its associated problems. When problems are defined, solutions as to how, where, when, and results can be proffered. Furthermore, perceived barriers relate to the opinion of the tangible and psychological costs of advised actions. When a disease is diagnosed, barriers that can impede treatment are also explored to reduce these barriers. As it relates to waterborne diseases, the barriers are identified in dearth of potable water and poverty among the populace. “Cues to action”, according to Glanz et al (2002) means promotion of awareness on a disease. People are reminded of adverse effects of waterborne diseases or other diseases as the case may be. Glanz et al, (2002) added the fifth dimension of cues of action to the discussion on health belief model. According to them, self-efficacy means one’s confidence in the ability to successfully perform an action. People are guided on how best to protect water, environment and creating society free of diseases.

From the foregoing, the relevance of HBM cannot be overemphasized. First, the belief a person has on a given disease, determines the effects that disease will have on the person state of mind. This may be manifested in the discomfort associated with such disease. Second, Individual’s belief that he/she is open to a disease is a form of health belief system. There is variation in individual perception of disease condition.

However, a fact remains that disease is a major issue in the human society, the life style a person lives as a member of society can influence the spread or otherwise of diseases. Health Belief Model (HBM) is central to this study as people’s opinion on the susceptibility, severity, barriers, cues to action and self-efficacy can assist in taming diseases in the human society.

National Cancer Institute (2005) listed the weaknesses of HBM to include non cognizance of environmental, social and other non-health related factors and placing the responsibility exclusively on man, but which in real life is not always the case

2.3.2 The Contrastive Model.

With weaknesses surrounding the other approach of HBM in the explanation of causation of diseases, another discourse christened Contrastive model was put forward. The major proponent of this model was Broadbent (2008), and according to this model, diseases may have more than one cause. According to the proponent, contrastive model has some assumptions and these are:

1. In order to have a disease, a person must have some symptoms of ill health; these symptoms are considered as parts of disease.
2. To have a disease, symptoms must be caused by a certain cause or causes that must not be causes of the absence of symptoms from the contrast class.

The model was proposed and defended on the ground that there are links between disease and symptom. It is believed that, some cause or causes are specified for each disease. Broadbent (2008) using pig as an example posited that, there may be pigs with either the bacterial or virus in them, but not both. For example, there is no bar to show that swine influenza is caused by both bacterium and virus. According to this model, two key words (Symptom and Causes) were emphasized. Thus for a person to have a disease, there must be symptom of ill health. Therefore, for a complete definition of a disease, the symptom must be defined.

Lipton (2004) had used this model in Semmelweis, Vienna in the 19th century on the difference between two hospital wards. It was discovered that, there was contrastive structure, which links disease to contrastive causal explanation. This model fits into the study, as no disease occur without a cause (s).

A case that comes to mind is the prevalence of waterborne diseases that has been linked to many causes.

2.3.3 Traditional Theory of Disease Causation.

The traditional theory, while using epilepsy as a case study submitted that epilepsy was caused by divine visitation and hence could only be cured by gods. In The Chinese Medicine, disharmony and illnesses only arise when one is stuck in an emotion. Similarly, Carteret (2011), opined that in a personalistic system, illness is believed to be caused by supernatural beings or a human being with special power such as witches and wizards. It is believed that, evil forces can cause illness in retaliation for moral and spiritual failure of the victim. Westhund (2006) also submitted that in some African cultures, the power of witches and wizards are also very relevant in disease causation.

Furthermore, Galanti (2004) equally affirmed that some Asian patients believe that though germs play a role in disease causation, but hot-cold imbalances make a person susceptible to illnesses. In the same vein, in Latino culture, Galanti submitted further that there are differences between natural and supernatural illnesses. Spector (2004) studied the black Americans and concluded that for black American Christians, religious faith and prayers remain powerful in disease eradication. While the black America Muslims relied heavily on the month long Ramadan fasting as an anti-dote for cure of diseases.

These views had little consideration for physical disorder and other environmental factors. Prior to interest shown in guinea worm studies, the occurrence of the disease was believed to have a divine link. With the passage of time and renewed efforts in the medical field, the submissions that diseases have divine causation are being replaced with other disease causation theories.

2.3.4. The Humoral Theory of Disease Causation.

Thagard (1997) reported that Hippocrates came up with the theory christened Humoral theory as an alternative to the traditional approach. Hippocrates, a Greek lived around 460BC, but this work according to Bulloch (1979) was translated by Galen and others. This theory affirmed that, all human diseases arise from imbalance between bile and phlegm when one of them either becomes too moist, too dry or too cold as a result of food and drinks. According to Gill (2014), human body is made up of four humors- blood, yellow bile, phlegm and black bile; hence imbalance and balance combination of these causes pain and health impairment respectively.

This school of thought opined that, too much bile can lead to various fever and too much phlegm can lead to epilepsy. The author defined health as a state in human body in which four humors mentioned above are in correct proportions to each other, both in strength and quantity and are well mixed. Further, bile and phlegm may produce diseases inside the body as a result of the foods and drinks, from exertions and wounds, from smell, sound, sight and venery and from heat and cold(Logan,1973).

Foods and drinks are products of the environment that are subject to changes and which according to Centers for Disease Control (CDC) has aided the outbreak of the diseases. According to Vidal, (2012), there are about 852 million food unsecured people in the world. The result is that, because of scarcity of food, imbalance in the adequacy of food taken daily may ensue, creating a state of defective biological functioning in man leading to diseases.

This theory did not last long as a result of weakness inherent in it, because the imbalance in

bile and phlegm emphasized by the humoralist may occur from natural causes and may be treated by changing either the diet or environment or the humor imbalance itself. Additionally, an imbalance of either bile or phlegm may be eliminated through the inducement of vomiting or evacuation of bowel.

2.3.5 The Contagion Theory of Disease Causation.

As the medical knowledge advances, Fracastoro offered other causes of disease. In this theory, Fracastoro did not deny the existence of four humours as postulated by Hippocrates, but suggested that there are large classes of diseases caused by contagion. According to Fracastoro (1930), contagion is a corruption, which develops in the substance of a combination, passes from one thing to another, usually caused by infection of the imperceptible particles. The theorist averred that contagion is present in three forms-(i) Contagion by contact; (ii) Contagion by fomites and (iii) Contagion at a distance. Contagion by fomites refer to the tangible items such as clothes, wooden things and similar sorts, which are not themselves corrupt, but can preserve the original germs of contagion. The core of this theory centers on the fact that diseases are products of the environment and eliminating same can be achieved through direct contact and indirect means via clothes and other substances and by long distance transmission.

The theorist opined further that diseases can occur spontaneously from individual. Accordingly, suggestions were made on treating diseases through the destruction and expulsion of contagion from the body. Destruction of diseases from the body can be done through extreme heat and cold, while evacuation can be achieved with movement of bowel, urination, sweating, bloodletting and other methods.

In a major study similar to the findings of this theory John Snow was able to establish the relationship between water and some diseases, particularly cholera.

The study submitted that, water rather than air can influence the prevalence of cholera and that cholera incidence can be greater among the residents receiving water piped from a contaminated source than from a relatively pure source. John Snow in a study of Central London shows how cases of cholera were traced to a single source of contaminated drinking water of River Thames in the 19th Century.

Using statistics from General Register Office to establish the unusual number of the 1853-54 fatalities among those drinking water from pump there(Tuthill,2003). John Snow, through the process of elimination evolved a workhouse in the study area that had its own well and there were only 5 deaths in the population of 535 inmates. In the same vein, a brewery along the Broad Street avoided water from the Broad Street public pump, and no casualty was recorded amongst its 70 workers (Hydroville Curriculum Project, 2004).

Over the years, researches have shown that social determinants which include occupation, education, income, environment, place and types of residence have roles in health status of the people (WHO, 2008; WHO, 2014). The World Health Organization (2008) affirmed that the social determinants are shaped by political, social and economic structures, which have resulted from bad policies, economics and politics in most developing countries. These factors have also created poverty, which is manifested in material deprivation (food, shelter, sanitation, and safe drinking water), lack of education, unemployment, social exclusion, and low income.

The relationship between poverty and health is inseparable one, as the duo can determine the socio-economic status of any country. The inequalities in the income of people also determine their access to health and other social justices (Mullaly, Robert and Wolfe, 2009; Rowlingson, 2011).

Socially accepted and human dignifying income can aid access to quality water and

adequate medical service, if a person is exposed to some illnesses and diseases.

The theory became important foundation for germs theory, which eventually became useful for germs theorists such as Lister, Koch, Pasteur and others. The implication of this theory in the present study is predicated in the position of potable water as a panacea for waterborne disease free society.

2.3.6 The Germs Theory of Disease Causation.

Tortora, Funke and Case (1995) confirmed that, the making of germs theory was a collective effort of many scientists which took many years. The list of these scientists included Pasteur, Lister, Koch and others (Geison, 1995). Thus the effort of these scientists from 1860 and 1870 resulted in germs theory, which today is central to explanation in germs causation. The germ theory viewed diseases in terms of their microbial causes, thus according to this school of thought, fever is not a disease, but a symptom of infection. The germ theory is the collection of research efforts of the scientist mentioned above.

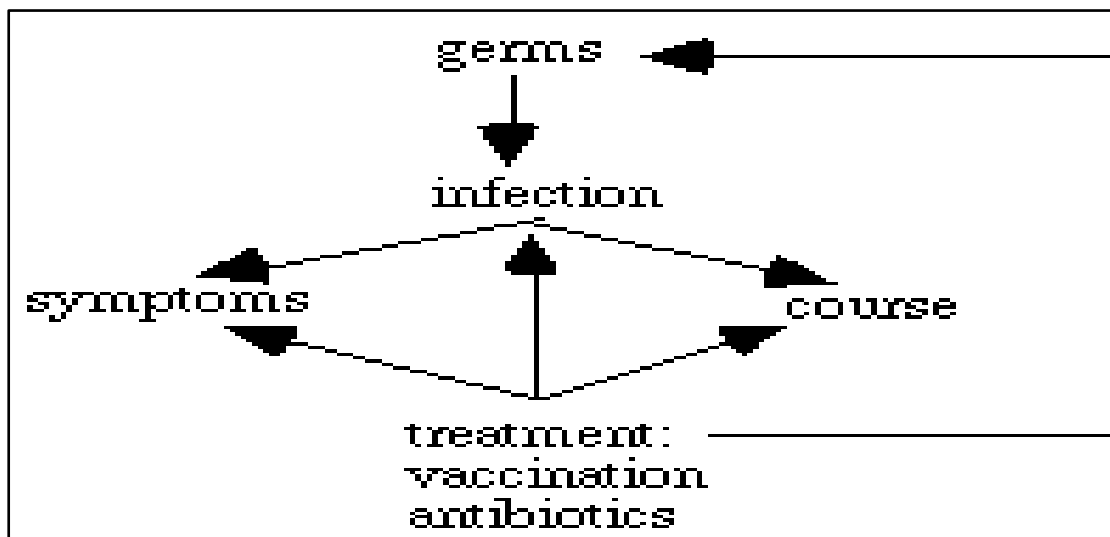


Figure 2.3: Germ Theory of Disease
Source: Thagard, 1997.

The work of Pasteur premised on the process of fermentation and was able to show that the yeast increase the weight of nitrogen and carbon content during fermentation, thus proving that yeast is a living organism and 1860s, Pasteur was able to discover bacteria. Furthermore, Lister and Pasteur delved into analogy between fermentation and disease.

They concluded in their work that just as fermentation is to yeast and bacteria, so also is diseases to micro-organisms. Pasteur was able to show that decomposition of organic substances is either made possible by oxygen or any of its gaseous constituents that the air owe, but the minute particles suspended in it, which are germs of various low forms of life. The principles of Pasteur were used by Lister to treat compound fracture. In the same vein Robert Koch, a German doctor, was able to show that many different kinds of bacteria are responsible specified diseases. The result is that today, infectious diseases are classified as bacteria, viral and protozoa (Thagard, 1997).

Although, Hippocrates and others were the first set of scientists to have ventured into causes of diseases, their work has become a reference point to geographers. For example, Babatimehin (2005) has used the theory to explain the spatial analysis of *Onchocerciasis* in Kwara State. A look at Figure 2.3 shows the diagrammatical flow of diseases; germs are considered to be the cause of all diseases. A germ is a microorganism that causes diseases. A person is said to be diseased, if he/she is infected by a disease and this is manifested in symptoms. Consequently, diseases that result from germs infections are treated through vaccination. However, central to all the theories highlighted above, is that, diseases are product of the environment that has remained a cog in the wheel of progress of man. The ultimate goal is therefore to eradicate it so that healthy living of man can be guaranteed.

2.4 LITERATURE REVIEW.

2.4.1 Environmental Determinants of Waterborne Diseases.

In every human society, safe and adequate supply of water is of importance. For one, safe water supply is a panacea for water borne diseases that has ravaged human society (Babatimehin, 2005). Safe water is a means to economic growth, as it encourages wellbeing of the people on whom the economic growth depends (Obansa, 2011).

However, available literatures have shown that, human society is faced with the problem of inadequacy of water and this has resulted in the emergence of many water borne diseases (Lucas and Gilles, 1991; WHO, 2010; Water Aids, 2011). Alakija (2000) affirmed the factor of environment as a major determinant of water borne diseases in the human society. Alakija affirmed that, water borne diseases such as malaria, guinea worm among others have all resulted from interactions with the environment.

This relationship is as explained in Figure 2.4

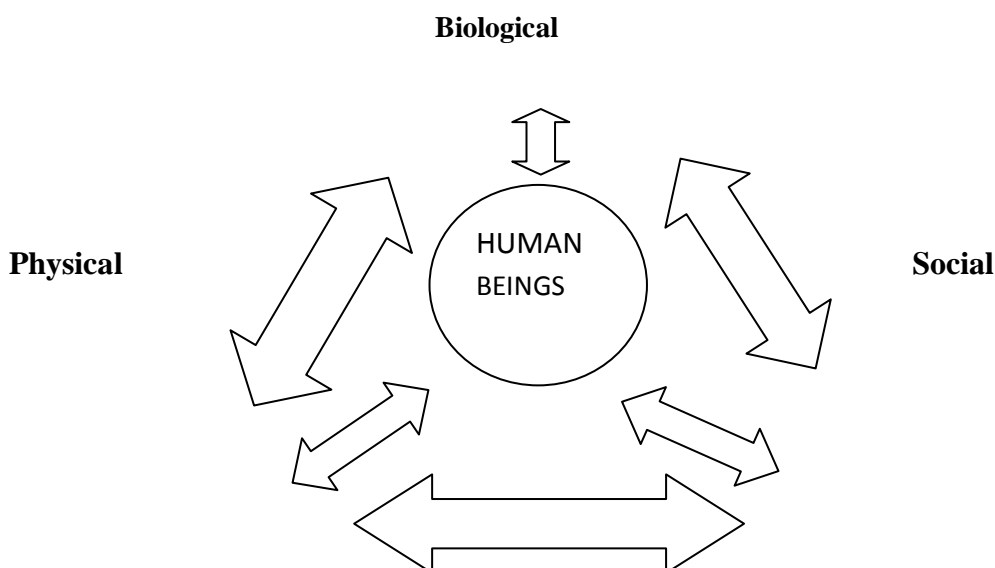


Figure 2.4: The interaction between human beings and their environment

Source: Lucas and Gilles, 1991

Man's environment consists of three major component-physical, social and biological. The relationship between man and his environment is symbiotic, as the environment is one of the determinants of human activities. Dearth of potable water in the study area provides suitable ground for waterborne diseases to thrive. As man clears the environment to suit his desires, new hazards are created as may be seen in erosion among others. In the same vein, vectors of diseases may thrive.

As a result of this, communicable diseases have become resistant to drugs, as areas not known for certain diseases are now reporting high cases of their incidences.

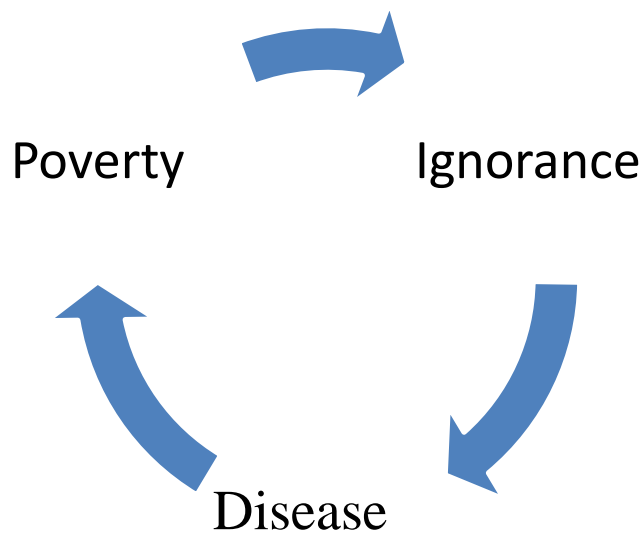


Figure 2.5: The Circle of Ignorance, Poverty and Disease

Source: Lucas and Gilles, 1991

Areas not known for certain diseases are now known to be infested by such diseases and alcoholism and drug abuse ensue as social stresses and tensions (Lucas et al, 1991). Similarly, Adetokunbo and Gilles (1991) also identified a link between poverty, ignorance and diseases.

They averred that, as a result of inequality in technological know-how in the tropics as manifested in limited accessibility to social services, low level of economic development among others, many of these countries are still held tightly in the vicious circle of ignorance, poverty and disease (See Fig.2.5).

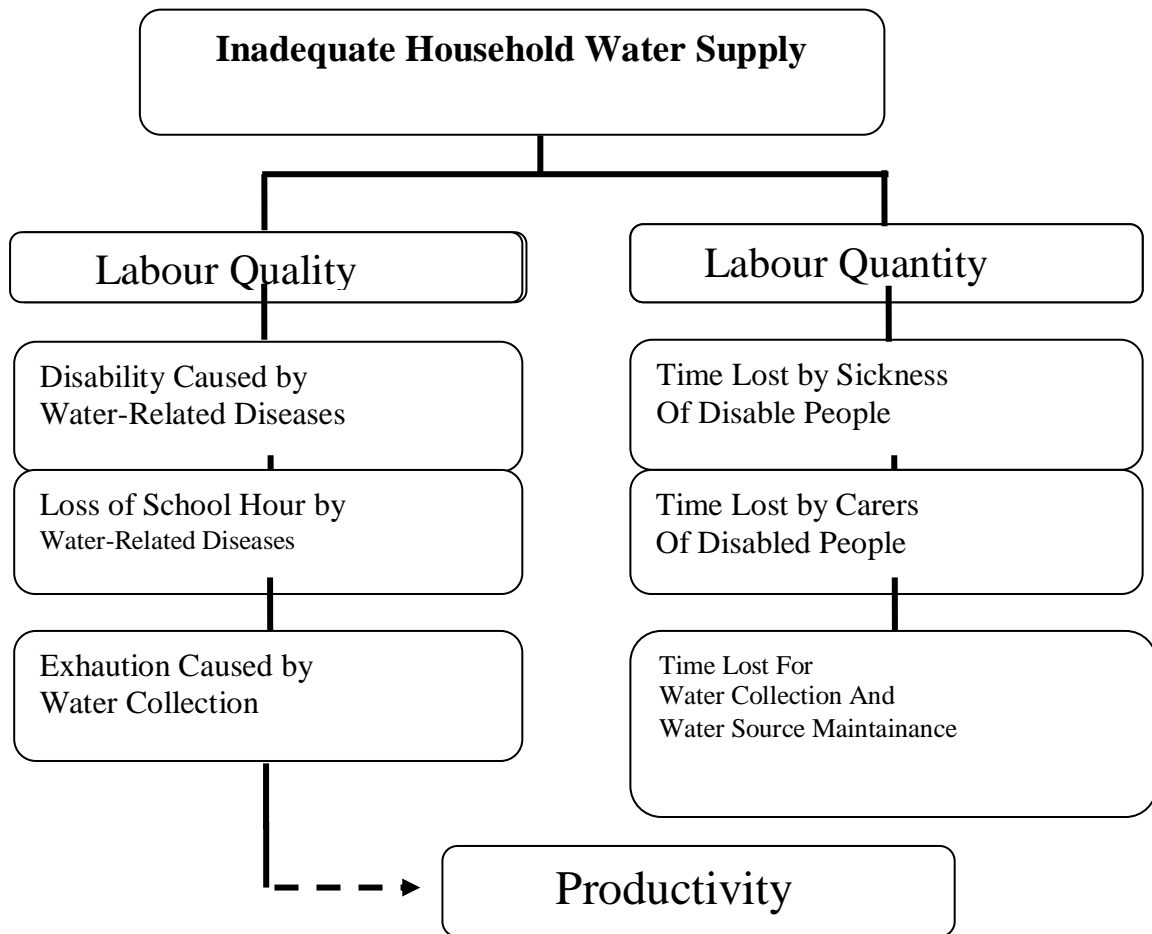


Figure 2.6: Connections between household water supply and reduced productivity.

Source: Rosen and Vincent (1999)

In the same vein, Moe and Rheingans (2006) also identified inadequate investment in water and sanitation, lack of political will, tendency to avoid new technology and sanitation and failure to evaluate the success and sustainability of such water and sanitation programmes, as some of problems of water and sanitation.

There is a strong link between available water and sanitation and disease in the human society (Lee, 2004).

The inadequacy of the former in supply to households can cause offensive odour, resulting in severe health problems (Ariyo and Jerome, 2004).

The Millennium Development Goals (MDGs) task force on water and sanitation ranked Nigeria among the countries having moderate water access. In a study on assessment of water and sanitation of Ikaram Millennium Village, Nigeria, Chovwen, Orebiyi, Savadogo, Afere and Afolayan (2009) affirmed that potable water and adequate sanitation are vital to the development of any society. Mustapha and Adamu (1991), studied water problems in Nigeria, with particular reference to Bauchi State and it was concluded that as at 1985, only 20.0% of people of Bauchi State had access to potable water. However, 24years thereafter, over 65.0% of the people in Bauchi State still get their water from questionable sources (NPC, 2009). This scenario has left a wide gap between the people and development.

In another study by Oguntoke, Aboderin and Bankole (2009) on association between waterborne diseases, morbidity pattern and water quality in parts of Ibadan City. The study concluded that, the increase in the occurrence of waterborne diseases in Ibadan City is as result of unsafe water, inadequate sanitation and poor hygiene amongst the human populace. It was concluded that provision of potable water is a panacea against waterborne diseases.

In a study carried out in Ilorin metropolis, Kwara State on availability, adequacy and quality of water supply, Aderibigbe, Awoyemi, and Osagbemi (2008), concluded that potable water is quite inadequate with poor quality in terms of the biological component.

That safe water and adequate sanitation is the bedrock of development in human society, is not a farce. According to Chowwen et al (2009), access to water and adequate sanitation prevents the spread of waterborne and sanitation related diseases.

Additionally, lack safe water and adequate sanitation services, especially in the developing countries often result in about two million infant deaths annually (WHO,2000; Seagar,2006).

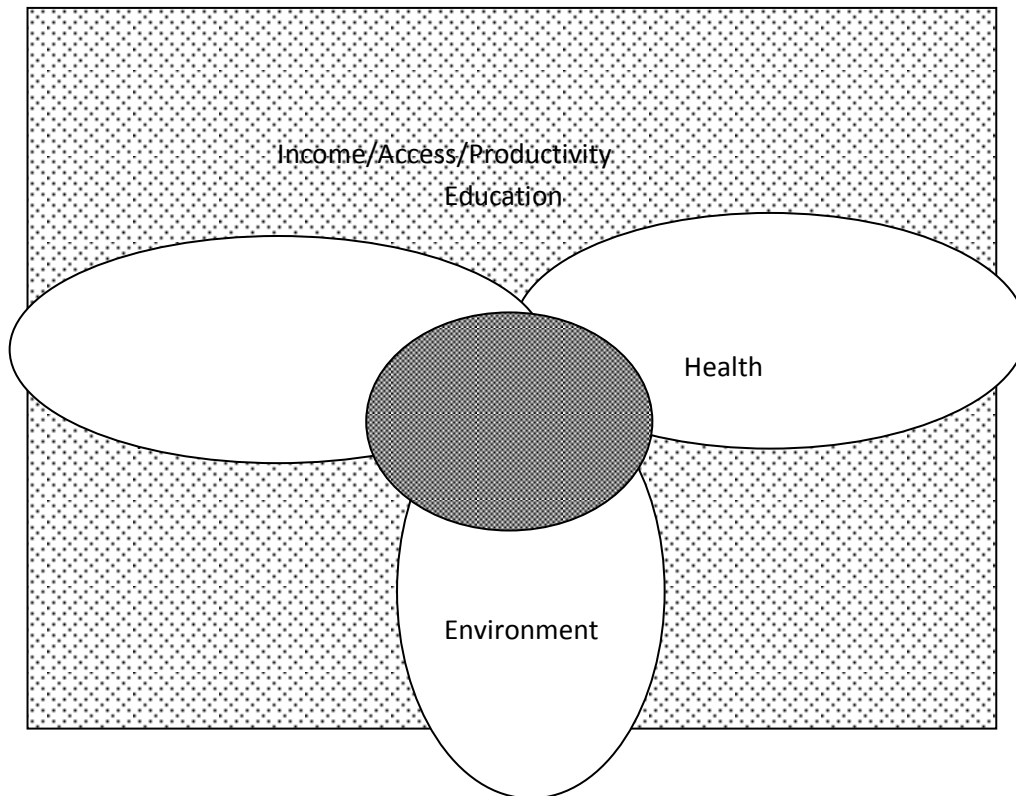


Figure 2.7: Water, Environment and Man Relation

Source: Federal Republic of Nigeria’s Water Supply & Sanitation Interim Strategy Note, 2000.

2.4.2 Classification of Waterborne Diseases.

In classifying waterborne diseases, Bradley came up with environmental classification of waterborne diseases, which was called “water-washed” diseases.

These are water borne diseases that are transmitted through insufficient quantities of water for personal and domestic hygiene (White, Bradley and White, 1972). According to this school of thought; all waterborne diseases can be transmitted by water through washed route.

In 1975 a further classification was proposed by Mara and Feachem. In that proposal, waterborne and water-washed were united to form Feco-oral. The resulting infections as listed by Mara (1999) are:

- (i) feco-oral waterborne and water-washed diseases
- (ii) non-feco-oral water-washed diseases
- (iii) water-based
- (iv) insect-vector diseases
- (v) rodent-vector diseases
- (vi) taeniasis
- (vii) geohelminthiasis

Similarly, Lucas and Gilles (1991) identified five forms of waterborne diseases and these are:

1. Water-borne infections: - These are diseases that one contact through drinking of contaminated water. These may include such diseases as cholera, typhoid, and hepatitis
2. Water-shortage diseases:-Theses are diseases that may result from absence of potable water. Examples of these are trachoma.

3. Water-impounding diseases:--Diseases that result from parasitic agents that may go into cysts and may include such diseases as guinea worm and *Schistosomiasis*.
4. Water-arthropod diseases: -Mostly they are diseases that may result from creatures that have lived and spent their life cycle in water. Examples are malaria and *Onchocerciasis*.
5. Chemical constituent diseases: - These are diseases that may ensue as a result of excess or shortage of a constituent.

Cochran, Ewald and Cochran, (2000) also gave a similar categorization of diseases. Similarly, Gleick (2002) identified four classes of waterborne diseases and these are water-washed, water-based, water-related and waterborne diseases. According to this classification, water-washed diseases can be caused by poor personal hygiene and skin or eye contact with contaminated water, which can result to scabies, trachoma, and flea. This is most common in many developing countries, because of insufficient clean water for washing and personal hygiene.

Water related diseases according to this classification are caused by insect vectors, especially mosquitoes that breed in water including *filariasis*, *onchocerciasis* and *trypanosomiasis*. In the same vein, Gleick(2002) opined that water-based diseases may result from consumption of water containing hosts that lives in water or require water for part of their life cycle. In many parts of developing world, wastes are openly deposited, most of which end up in the hydrological system. These are manifested in the high incidence of waterborne diseases in these countries. Most noticeable diseases resulting from these are *schistosomiasis* and *dracunculiasis* (Guinea worm) and it is currently estimated that 200million suffers from *schistosomiasis* globally.

The summary of the above is that, waterborne diseases can be linked to many causes; provision of potable water is therefore a prerequisite to the eradication of these diseases. The failure on the part of policy makers to provide water can manifest in the high degree of morbidity and mortality, particularly among the poorest populations (Gleick, 2002).

This leads us to models that fit into this study, which over the years has assisted in similar researches. The relevant concept in this study are the health belief model (HBM), and contrastive mode.

2.4.3 Perception of People on the Causes of Disease.

Disease is one of the major challenges facing humanity. This may be as a result of problems associated with it. No human society is totally free from one disease or the other, not even the advanced countries of the world. However, there are variations in the belief on the causes of diseases. The belief in African society where social justices are lacking differs from other part of world. People's perception of disease can have a marked effect on the success of scientific intervention (Houmsou, Kela, Suleiman and Ogidi, 2013). The biblical account of the serpent snake in relation to the occurrence of guinea worm epidemic in the Great Babylonia is an example that comes to mind.

The occurrence of this disease was believed to be having a divine linkage. However, in most part of medieval Asia and Latin America, it was believed that, a disease can be caused by intervention of a supernatural being, which can either be a deity or a dead ancestor (Carteret, 2011). For instance, in Northern India, Kolendra (1983) documented that, the Mariamman goddess was believed to have power not only to cure, but cause diseases such as smallpox and rashes. While in ancient Mesopotomia, the Namtar god was considered as a god of deaths and diseases.

Jeremy and Green (date not stated) submitted that, Namtar according to this mythology had the power to command sixty diseases that can penetrate parts of human body. Such diseases could only be ward off through appeasement. This is similar to the findings of Nwoke (1992) in Imo State, Nigeria, where 89.0% of the respondents shared the belief that occurrence of guinea worm can result from attacks from enemies and heredity. Babatimehin (2005) reported the perception of *Onchocerciasis* among the Nupe of Patigi Local Government Area of Kwara State that, 58.0% of respondents associated the occurrence of the disease to witches and evil machination of the enemies. Odebiyi and Ekong (1982) posited that in the traditional Yoruba societies, occurrence of measles, which is usually referred to as ‘*Sanpana*’ is associated to causes that have nothing with virus. According to Feyisetan et al as cited by Bababtimehin (2005), it is commonly held that such occurrences may be as result of breaching family taboos or attack from witches and wizard.

Sabuni (2007) in a study of Bira of Mobala and Nande of Mukulia in the Democratic Republic of Congo submitted that, witchcraft is assumed to be a strong cause of illnesses. Similarly, other African cultures are of the belief that, an offence against a god can attract punishment with a disease and such punishment is not lifted until a sacrifice is offered to the god. In other African societies, mild disease is considered a normal thing; it is abnormal for a person, to be healthy the year round. When a disease persists, it is considered to be abnormal, and the traditional health providers are consulted. The deities are consulted for a possible solution. In some other cases, in some African societies, it is believed that abnormal diseases can be prevented by wearing amulets, and making offerings to the deities.

In what looks like a modern way of disease causation, Schaller, Miller, Gervais, Yager and Chen (2010) opined that mere visual perception of diseases connoting cues promotes a more aggressive immune response.

Expressing similar view, Miller (2012) submitted that a person's behavioural and immune system can act as a smoke detector by signaling the body to prepare for a disease. The study, affirmed that participants who read an article about HiNi flu virus were more likely to mistakenly categorize pictures of these individuals, than participants who read a control article. Central to these submissions is that, beliefs and social life of individuals can influence sicknesses and diseases in the human society.

Occurrence and dysfunction associated to diseases have been linked to three main broad causes; these are (i) injury (ii) toxicity and (iii) deficiency (Scully, 2004; Kim, 2008).

Injury:-As a cause of a disease, injury can result in cellular damage, gross stress, emotional and electromagnetic injury. All these can result from highly processed foods, known for their destructive influence on the major organs and blood vessels.

Toxicity: Poisons that makes disease thrive in human bodies are exogenous and endogenous. Exogenous are chemicals that are produced outside our bodies, but not ideal for our consumption

On the other hand, endogenous toxicity is chemical produced in human system, which if not expelled from our system can add to toxic level of the body.

Deficiency: Human bodies caves in the absence of adequate nutrients, physical emotional, sunlight/fresh air and affection.

All these schools of thought may have relativity in the level of ignorance, which has provided the enabling environment for these diseases to thrive.

In order to remain healthy, a normal human being needs enough nutrient-dense foods. This is necessary for the build and repair of damaged cells as well as for carrying out daily activities. As much as possible, this should be carried out in an adequate physical rest; exposure to fresh and unadulterated air in decent environment can wade off diseases. The variations on the perception on what constitute the causes of diseases are as presented in literatures above. With regard to prevention and treatment of diseases, there is variation on the steps that are used.

2.4.4 Social Determinants and Health.

Social determinants are factors that describe living condition of a person. It is related to income, education, marital status, age, occupation, types and ownership of such accommodation.

According to U.S. Department of Health and Human Services (2009), the current health state of a person is dependent on a number of factors and these are:-

- (i) Biological and genetics- According to WHO (2014) men and women suffer from different diseases at different ages. Additionally, human being inherits one disease or the other from either of the parent.

All these have their impact on the well-being of people, which invariably affect the productivity of society.

- (ii) Individual behavior:-The attitude of individuals determines their health status. A good example that comes to mind is a person who is promiscuous; the tendency is that such a person may not be free from sexually transmitted diseases.

- (iii) Social Environment:-Among the social environment that is of importance to man are family size, income, education among others. According to Barnett and Casper (2001), the social environment of a person includes their living and working conditions, income, educational background and the community they are part of. The higher the income, the more accessible to better health facilities. In many developing countries, accessibility to improve health facilities is difficult. In some other cases, where these facilities are available, trained personnel may not be available. In a study of Osun State, South-Western - Nigeria, Ajala, Sanni and Adeyinka, (2005), concluded that there is a serious inadequacy in provision of health care facilities and services by both the public and private sectors.
- (iv) Occupation status according to MacArthur as cited and prepared by Burgard, Stewart and Schwartz (2003) is a reflection of social position, income and education of a person. This infers that one's occupational status in relation to health is a determinant of a person's health .It follows that income and influence resulting from an occupation can influence health behavior of a person.
- (v) Education, which is another element of social environment, also determines the health status of people. The Australian Bureau of Statistics (2010) confirmed that there is a link between educational attainment and health outcomes. In a survey of Aboriginal and Torres Strait Islander, 59.0% of people aged 15-34 were of adequate education.
- (vi) Education can also influence the income, and invariably the health; it can also aid the fight against risk health behavior.

- (vii) Physical Environment:-This comprises of all the physical and social conditions that surround a person.
- (viii) The availability of safe water, clean air, health workplaces, safe houses and roads all contribute to good health (Slanna, 2006).

The existence or otherwise of these conditions to a large extent determines the life quality of a person .For instance, The European Union (2013) is of the opinion that, clean air is essential to a person's health and environment. According to WHO (2011), over 2 million people die from air pollution yearly.

This has been attributed to motor transport, small-scale manufacturers, burning of biomass and coal/residential wood, especially in the rural areas.

Literatures have shown that dearth of safe water has manifested in the prevalence of water and sanitation related diseases (Sawka, 2005; Jabeen et al, 2011; Adewusi, 2012). The situation in the developing countries is pathetic, that their socio-economic sector is in disarray. Dearth of potable water has led to deaths of many, further subjecting people to impoverishment. For an adequate physical environment, an ideal work place is a necessity. A work place according to WHO (2014), a work place directly influences physical, mental, economic and social well-being of workers and in turn the families, communities and society. WHO posited further, that a healthy workplace is one in which workers and managers collaborate to use a continual improvement process to protect and promote the health, safety and well-being of all workers and sustainability of the workplace.

- (ix) Health Services:-Accessibility to Medical services is an asset in the development process of any human society. It determines the productivity of a people, as a sickly society will continue to wallow in poverty.

The relationship between social determinants and health status of a society are interwoven; as the health status of a society depend on the available social justices available to it and vice versa. The World Health Organization (2013) is of opinion that whether people are healthy or not, is dependent on their environmental circumstances and accessible health facility available to them. Accessibility to health care facilities has been identified as a major indicator of development (Ajala, Sanni and Adeyinka, 2005).

The relevance of health care facilities in the development of any society cannot be swept under carpet. In a study of Osun State, Ajala et al (2005;124)concluded that inadequate health facilities can lead to inefficiency in production, declining productivity, reduction in life expectancy and increase infant mortality.

2.4.5 Spatio-Temporal Pattern of Waterborne Diseases in Nigeria.

Lack of safe water and sanitation is the world's largest cause of illness and this according to Lee (2004) has led to the death of about 4,500 children daily (Adewusi, 2012). The same scenario pervades the Nigeria landscape, as provision of safe water is major challenge. Generally, National Population Commission (2009) submits that, many Nigerians suffer from some of these diseases. According to this account, more than 32million Nigerians suffers from *Onchocerciasis*, while over 13.0% are in the bondage of lymphatic filariasis. Table 2.1 present a temporal pattern of significant waterborne diseases in Nigeria.

Table 2.1: Temporal Pattern of waterborne Diseases in Nigeria.

Major Waterborne Diseases	2005	2006	2007	2008	2009	2010
Cholera	10,785	20,526	12,194	17,854	16,913	46,782
Diahorea	682,828	800,611	1,069,133	967,236	1,200,151	5,553,970
* <i>Schistosomiasis(L)</i>	5,548	6,419	5,222	4,801	5,149	7,601
<i>Trypanosomiasis(L)</i>	5,548	6,419	6,499	7,065	8,144	7,196
Typhoid	40,114	41,388	50,195	57,199	47,000	103,338
<i>Onchocerciasis(L)</i>	6,161	6,161	9,407	7,050	24,748	11,570

Sources: National Bureau of Statistics, 2010.

*Federal Ministry of Health, 2010 (Unpublished Record)

However, the National Bureau of Statistics (2010) reveals that there is prevalence of waterborne diseases across Nigeria. The temporal analysis of data from available record shows that, in 2005, Nigeria had reported cases of cholera of about 10,785 and in 2010 it recorded the highest cases of 46,782 of the same disease. Similarly, about 682,828 cases of diahorea were reported in 2005 and by 2010, the figure went up to 5,553,970 cases. In 2005, over 3,728 cases of *onchocerciasis (L)* were reported and by 2010 the number of cases had gone up to 11,570. Between 2005 and 2010, there were reported cases of 34,740 of *schistosomiasis (L)* with 2010 recording the highest of 7,601 cases. Typhoid, which is another major waterborne disease, had highest number of occurrence in 2010 with 103,338 cases increasing from 40,114 cases in 2005 (Table.2.1)

In recognition of waterborne diseases as a major health issue some policy efforts have been made. For example, Integrated Surveillance Response Unit (ISRU) was set up in the Federal Ministry of Health to among other things respond quickly to diseases. In addition to this, water which is the panacea for disease prevention has been prioritized at all levels of government. The Federal Government of Nigeria (FGN) has adopted water supply as part of National Health Policy.

The Federal Government of Nigeria has also key in to UN Millennium Development Goals(MDGs) of making water available to at least over 60.0% of Nigerians by 2015. The United Nations has also given water an important place in their programmes through Millennium Development Goals (MDG) which places water as the 7th goal to be achieved. Part of the reasons may be linked to the level of education, particularly amongst women whose duty in the study area is provide domestic water. According to a survey by NPC (2009), 44.3% of women in the study area are not educated. The implication is that, no matter how well packaged a disease prevention program is, a society with low literacy rate will always fail.

Water situation in the study area is appalling. Out of 353 house hold heads involved in this study, over 80% agreed that, they dispose off their wastes openly. Over 60.0% also agreed that they source their water through wells and rivers/streams. This tally with the survey by National Population Commission on demographic and health in Nigeria, where accessibility to potable and sanitary facilities stands at 65.4% and 10.4% in the population respectively.

The nature of socio-economic activities to a large extent determines the level of disease infection. Waterborne diseases are common with areas with poor potable water condition (Oguntoke et al, 2009; WaterAid, 2009). Majority of people in the study area are farmers and are mostly confined to rural areas (Oyebanji, 2000). This study has shown that, over 75.0% of the respondents are farmers, who have had a waterborne disease infection at one time or the other. This may be linked to their interaction with water, which is mostly unkept, thus not good for human consumption.

Another important factor that aids the prevalence of waterborne diseases in the study area and in the human society is the climate.

Climate regulates the level of water available, which in turn affects the rate of transmission of diseases.

2.4.6 Synergy between Potable Water, Sanitation and Human Development.

Availability of potable water is a major challenge facing many human societies globally today (Mirkin, 2014). This may be associated with increment in the use to which water is put; the population keeps growing without corresponding increase in the safe water, sewage, and sanitation facilities (UNDESA, 2011). Thus, it is not an understatement that, existence of human being evolves partly on potable water and adequate sanitation. However the dearth of this essential of life, in the face of population growth is a major issue.

Available records show that, in the next few decades, population growth will be the world's most important challenge (Mirkin, 2014). This may be as a result of problems associated with it. Nigeria, for example has a population of over 140 million people and it is being projected that, going by the growth rate of 3.2%, her population may get close to 170 million people by the year 2020 (NPC, 2009). The United Nations Department of Economic and Social Affairs (2014) affirm that the World population is currently growing at the rate of 1.14% per year. The same trend is noticed in other parts of the world, particularly the less developed countries where according to United Nations (2006), urban population will grow from 1.9 billion in 2000 to 3.9 billion people in 2030. It is the same story in the developed countries, where urban population is expected to increase from 0.9 billion in 2000 to 1 billion people in 2030.

The implication of the above scenario according to Khatri and Vairavamoorthy (2007) and UNDESA, has led to depletion of the available water sources. In developing world, it has been estimated that, one-third of the population will face severe water shortages by 2025

(UNDESA, 2014). With reference to Africa, by 2025, a total of 1.1 billion people or two-thirds of Africa's population will be affected (Dzikus, 2001; UNFPA, 2006).

Nigeria with noticeable population growth without correspondent increase in the delivery of essential services, particularly portable water is faced with water supply. In fact, Nigeria is one of countries in Africa that is expected to face the problem of potable water by 2025 (WaterAid, 2009). Krebs (2010) submitted that, out of 152million people living in Nigeria, less than 30.0% have access to adequate drinking water. Although a survey by National Population Commission (2009), showed that 64.6% of the people in the urban areas have access to improved sources of water, but the reality on ground does not support same.

The same can be said of the rural areas of Nigeria, which house about 70.0% of the people. The case of portable water supply in the rural areas worries mind. Large percentage of rural areas suffers from many waterborne diseases, thus meeting the MDG target may remain difficult. This has further aggravated the poverty level of the people (Ki-moon, 2011). There are linkages between water supply, sanitation and human development. This is manifested in education sector, where school enrolment among girls is low because of time spent collecting water, high crime against women due to lack of toilet privacy among others. Water supply has inflicted pains on many families as a result of loss of their children. This is most prominent among the children below five years.

2.4.7 Effects of Waterborne Diseases.

Over the years, waterborne diseases have been a major health issue, because of its direct effects on the people. The problems attendant to and constraints associated to waterborne diseases are manifested in many ways.

One of this is in the area of education, where waterborne diseases have led to incapacitation of the victims and eventually making them to drop out of the school.

The NPC (2009) affirms that 44.3% of females in Kwara State do not have formal education and this may not be unconnected with diversitating effect of waterborne diseases among others. Similarly, waterborne diseases impose limit to enjoyment of life. This may take the form of incapacitating the victims for several months. Edungbola (2006) and Garba et al (2010) agreed that, guinea worm and other waterborne diseases can render the victims useless for up to three months. The implication of this, is that agriculture which is the main stay of economy of this area will suffer, and may lead to acute food shortage (FAO, 2007), further aggravating the already existing poverty level of people.

Waterborne disease cause economic loss, as result of disability that may ensue which may in turn lead to disruptions in trade and travel (Yvan, et al, 2003; Ajala et al, 2005). The effects of waterborne can also manifest in the death of adults and children. Oguntoke et al (2009) and Akintola (2011) affirmed that, morbidity among the children ages less than five years is between 15.0-18.0%. Of 353 household heads interviewed, over 90.0% agreed that, waterborne diseases have negative effects on the people.

Waterborne diseases can retard the socio-economic development of the people (CDC, 2012). Energies that are required in some other sectors of the economy are diverted to solving problems emanating from these diseases (Garba, et al, 2011). Recently, the Federal Government of Nigeria diverted large sum of money and energy not only to assuage the flood victims, but to prevent outbreak of waterborne diseases.

Additionally, malaria whose occurrence and dispersal is linked to water would require up to \$270million for it to be eradicated per year. The occurrence of malaria alone, has led to financial loss of ₦132million in Nigeria (Yishau and Chiejna, 2011).

2.4.8 Waterborne Diseases Eradication Initiatives.

That waterborne disease is a cog in the wheel of progress in any affected human society is not in doubt. Waterborne diseases and its accompanying debilitating effects have contributed to the underdevelopment of the endemic areas. This is manifested in the near destruction of economic activities of such areas, further aggravating general poverty of the people. The same diseases can lead to lost work days, missed educational opportunities, official and unofficial health costs, and draining of family resources (Gleick, 2006). With these destructive effects, the need for total eradication of the scourge becomes imperative.

Adewusi (2012) advocated two approaches to the prevention of waterborne diseases and these are : (i) Qualitative and (ii) Quantitative. According to the author, the first approach focuses on quality of water supply. The emphasis is fabrication of disinfection technique to prevent available sources of water safe. Adewusi (2012) applied these approaches in a study carried on Nigeria's water supply in relation to the elimination of waterborne diseases.

The result shows that, acute water shortage and defective environmental sanitation pose a threat to socio-economic development of Nigeria. Furthermore, because Nigeria is not operating in isolation and in conjunction with the United Nations, have adopted the Millennium Development Goals (MDGs), particularly as it affect water and sanitation. The Federal Government of Nigeria has also come up with a comprehensive water and sanitation policy (Federal Republic. Nigeria, 2000).

The Federal Government of Nigeria has fortified the River Basin Development Authorities, whose duty among others is to plan and develop water resources. Additionally, because of the link between water and sanitation, the weekly sanitation program was introduced in Nigeria. However the Nigerian factor has killed the enviable program, such that the sanitation program is only left to some state. It is worth mentioning that, having identified provision of adequate potable water as a panacea to eradication of waterborne diseases, Kwara State in conjunction with UNICEF through its Water and Sanitation Programme (WATSAN) has provided about 1,851 borehole sites between 2005/2006(Aganaba,2006). UNICEF has also spent about ₦500million for tackling the menace in the study area. The money was spent on additional provision/rehabilitation of safe water sources, capacity building, and hygiene education, provision of vehicles, motorcycles and bicycles.

The Kwara State Government has embarked on construction of dams and weirs across the three senatorial districts that make up the state (KWSPC, 2006).These are in addition to the expansion of the existing dams. In the last ten years, the Kwara State Government has been trying to improve the water status in the state through the expanded water programmes with a view to ameliorating the problems.

The Federal Government of Nigeria has also in partnership with non-governmental organizations and donor agencies gone into safe water production. The most important of this is African Development Bank, which has invested over USD905million since 1971 on many water projects in Nigeria (ADB, 2012). This is in addition to the contribution of the World Bank, which has completed seven water projects since 1985 at a cost of USD 1.4billion.

And in 2012, an additional USD400million was approved by World Bank for National Urban Sector Reform for some states (World Bank, 2010). The European Union also played key roles in Nigeria's strive for safe water and sanitation. The organization has granted over 87million Euros to support both water and sanitation in some states (WHO, 2010).

Also, The Federal Government of Nigeria through the Federal Ministry of health has also come up with Integrated Health Surveillance Unit (IHSU) to among others, monitor and report outbreak of diseases. The WaterAid (A UK non-governmental organization)is involved in proving safe water for the poor in Nigeria It is also involved in advocacy, particularly in the enlightenment of poor people on the merits of decent sanitation. In the same vein, private organizations have contributed to making safe water available to the masses. A case in mind is the contribution of Unilever Nigeria Plc. which has introduced a water purifier into the Nigeria market. Similarly, assistance has also come from friendly countries in the provision of safe water to the Nigeria masses.

The American Government through USAID has also contributed to Nigeria water and sanitation. It has been doing this in partnership with some Nigerian non-governmental agencies. The Japanese Government through JICA has given grants for rural water and sanitation.

In like manner, The Chinese Government had also in 2005 granted Nigeria an unspecified amount to drill 598 boreholes in 18 states and Abuja. Despite these initiatives, large proportion of the communities do not have access to potable water supply and thus there are indications of increase in the prevalence of various water related diseases in various locations in Nigeria.

2.4.9 Challenges to Eradicating Waterborne Diseases.

Waterborne disease is a major health issue that has shaped the socio-economic development of human society. It is a scourge that has defied solutions, thus putting the existence of man in danger. That lack of clean water and poor sanitation are second most important risk factor with its attendant problem is not a farce (Jabeen et al, 2011). It is this issue that worries mind, and thus how this can be fully mitigated form the nucleus of this section.

Health care system in Nigeria is influenced by different factors and this is manifested in many ways. Ajala et al (2005) submitted that there is geographical disparity in location of hospital in Nigeria as result of political interference. In a study carried out on accessibility to health care facilities of Osun State, South Western, Nigeria. It has been shown that there is disparity in location of health care facilities in the urban and rural areas. Furthermore, the available health care centers are ill-equipped in terms of personnel and equipment. The implication of this is mostly felt in reduction in the life expectancy and increase in infant mortality.

Majority of victims of waterborne diseases lacks awareness on the adverse of this scourge (Water Initiatives in Nigeria, 2011; Jabeen et al, 2011). Inadequate social data is another challenge facing initiatives aimed at fighting waterborne diseases in Nigeria. Literatures has shown that dearth of reliable data is one of the problems militating against developing countries globally.

Even when and where other resources are available and adequate data are not, the whole programmes may end up being a junk of failure. This may explain why many feasible programmes have failed in Nigeria and other African countries. The position of funding is vital to the achievement of a good progammes.

In Nigeria, lip service is paid to health and other sectors. The small available fund that is allocated to Federal Ministry of Health is spent taking care of health care in the urban areas. Another obstacle in achieving waterborne free society is rapid population growth, which has had its adverse effects on the existing infrastructure. Nigeria is growing at the rate of 2.55% per year, without corresponding increase in the infrastructure, particularly water facilities and sanitation. This has made people to resort to any available water for their uses. Study has shown that in developing countries, 95.0% of their untreated urban wastes are discharged openly into surface waters, which has remained a source of domestic water supply for many.

Population growth has also led to the clearance of vegetal cover, which hitherto had assisted in the conservation of the environment. Lastly, lack of maintenance culture by Nigerians of the existing water facilities has also led to spread of waterborne diseases. Most water pipes have become obsolete, such that water that is transported through them is not safe. The boreholes and some other sources of water are in their state of dysfunction.

With the poverty level at 46.0% and gross national product at 8.0%, the contribution of Nigerians through their disposable income may not be a solution.

2.4.10 Water and Socio-Economic Development.

The wellbeing of people, depend extensively on social justices accrue to them. There exists a close relationship between water and human welfare, which in turn has effects on the productivity of the society. Indeed, available water is a determinant of poverty status of a people (Ki-Moon, 2012). This may have informed the reason by the United Nations to have formulated multifaceted policies aimed at improving the well-being of mankind, with emphasis on provision of potable water as a cardinal

program. The program which is slated as number 7 in the MDG document, plan to make save water available to over 60.0% of the population globally by the year 2015(WHO, 2004). In Nigeria for instance, affordable water is a priority and this contained in a policy document on National Water Supply and Sanitation Policy (2004).

The document among other things sought to make safe water and sanitation priorities. In order to further confirm the central position of water and sanitation, The United Nations adopted a working policy for adoption, known as Millennium Development Goals with emphasis on supply of potable water for half the world population before 2015(WHO,2004). Availability of safe water according to Garba et al (2011) has its economic and scientific relevance. Food and Agriculture Organization (FAO, 2007) affirmed that in Africa, especially Nigeria, water related diseases, had been interfering with basic human development. Unsafe water can have adverse effects on the working class and loss of children, as the working hours may be lost to waterborne diseases (Akinola, 2011). The adverse effects of unsafe water can also be felt in many industries, where it is a raw material. Its short supply may affect the growth of such company and generation of employment.

Unsafe water can also lead to a further aggravation of poverty among the people since where potable water is accessible, collection time is reduced and this has potential to increase the income of households. In a study, Ahmedabad, (2006) affirmed that in India, households spend an average of 3.22 hours fetching water daily. Alao (2004) opined that availability of potable water can prevent communicable diseases, as the quantity of water used has an important impact on human health, because an effective sanitation is partly water-availability based.

Globally, unsafe water has placed burden on the people; high mortality couple with untimely deaths among the adults. Malaria and diarrhoea remain a threat to many. In Nigeria, the two diseases along with others have claimed many lives. The situation in the rural areas is pathetic owing to the apathy of governments in supplying safe water to the people.

However, despite the relevance of safe water to the development of society, the sector is faced with challenges. The sectoral allocation to water has dwindled of the years. In 2012 budgetary allocation, water sector was allocated ₦39billion, while in 2013 the same sector was allocated the sum of ₦47.8billion. The implication of this is that, Nigeria may not be able to achieve the MDGs in water supply, thus the probability for continuous occurrence and prevalence of diseases. Additionally, the link between poverty and diseases is a complex one.

Poverty according to WHO (2012) has many dimensions-lacks of food, shelter, sanitation, potable water. In Nigeria, the poverty level currently stand at 46.0%, and GDP growing at 8.0%(WHO, 2014).This trend according to WHO(2014),is not strong enough to reduce poverty in any society. And where poverty pervade, the socio-economic development of such a society will be in ruin, because health quality is a major determinant of the development of a nation (WHO, 2012). The implication of this is that, where government has failed in the provision of social amenities, people may have little or nothing to contribute. In the same vein, the rate of population growth in Nigeria without corresponding expansion of amenities is also a major challenge to achieving eradication of waterborne diseases.

The Nigeria population now grows at 2.55%, without the expansion of social amenities. By implication, the existing amenities are put under pressure; which may

weaken the amenities, thus forcing people to result to alternatives, good or bad. A disease free society is a type, where social justices are available, devoid of lack in the midst of plenty. The relevance of safe water to health status cannot be overemphasized, because people's accessibility to safe water goes a long way to improve their health and invariably determine their income, education, occupation and wellbeing of the larger society (WHO, 2012).

With particular reference to Nigeria, the water scenario vis a vis health is nothing to write home about. Available literatures have shown that safe water condition is worrisome in Nigeria (Babatimehin, 2005; NPC, 2009; Alakija, 2011; Africa Development Bank, 2012). This is not without its attendant problems, such as low productivity, and socio-economic deprivation. The mortality rate is also high, thus putting the future of Nigeria in danger. Generally, waterborne diseases are burden to the human society, and it is manifested in reduction in productivity and increase in the mortality among children. WHO (2004) affirmed that health impacts will be greater in areas where the level of potable water is low and where cases of waterborne diseases is high.

Development has been defined to include rise in standard of living, improvement in self-esteem and freedom of rights. The role of safe water in the aforementioned is vital to any development.

Certain waterborne diseases may not thrive in an area where water is available for domestic and sanitation uses. As WHO (2014) observed, poor people are vulnerable to waterborne diseases, because of their inaccessibility to basic social amenities such as health care, potable water and adequate sanitation.

The implication of the above submission is that, socio-economic development of any society will suffer, where those things that spur development are lacking. Safe water supply in Nigeria has been attributed to a number of reasons.

These problems have been identified to include inadequate technical know-how, inadequate funding and material factor (Alaci, 2010). Inadequate technical know-how has hindered capabilities for collecting, processing, storing, and analyzing hydrological data.

This has significant influence on the design of water projects. This problem is attested to by National Water and Sanitation policy launched in 2000. Uncontrolled population growth in Nigeria without corresponding increase in water facilities is another problem. Nigeria is currently growing at the annual growth rate of 2.55% and look at annual budgetary allocation reveals that water sector had not had a fair share of Federal allocation.

Table 2.2 revealed that there is irregularity in the annual budgetary allocation. While the same sector was allocated the sum of ~~₦~~47.81 billion in 2009, the sector got a little bit higher in 2010 budgetary allocation. Similarly, in 2011 and 2012, the sector got ~~₦~~62.00 billion and ~~₦~~85.50 billion respectively. Also, in 2013 budgetary allocation, water and sanitation was allocated the sum of ~~₦~~47.81 billion.

**Table 2.2: Annual Federal Allocations to Water Supply and Sanitation
in Nigeria (2009-2013)**

Year	Annual Allocation (₦billion)
2009	47.81
2010	112.00
2011	62.00
2012	85.50
2013	47.81

Source: Budget Office, Federal Ministry of Finance, 2013.

The scenario in Table 2.2 affirms that budgetary allocation does not support any serious safe water and sanitation programmes in Nigeria. These funds are not sufficient to make safe water available, talk less of sanitation problem, bearing in mind that many do not have access to adequate sanitation (WHO/UNICEF, 2012). It is therefore necessary to say that, for Nigeria to key in to United Nations programme of MDG and in achieving vision 2020 goals of the present administration, provision of potable water and adequate sanitation must be given priority. From the foregoing, improved water supply is fulcrum upon which social well-being in any society involves. This may be achieved through adoption of cost saving water and sanitation programmes.

2.4.11 Disease and Health Care System.

Health care system and disease are two interwoven phenomena that have greater influence on human society. While accessibility of people to health care is determinant of their productivity, a diseased people may not be able to work to support the health care system in a society (WHO, 2012). It therefore follows, a well-organized health care systems is an asset in the development process of any country.

Health care systems according to WHO consists of all organizations, people, and actions whose primary intent is to promote, restore or maintain health .This infer that health system encapsulate all efforts aimed at making available health care facilities. This may include health personnel, equipment, and structure among others. The principal goals of any ideal health system therefore are good health, responsiveness to the expectation of population and fair financial contribution (WHO, 2013).

It follows therefore that well organized health system is the foundation on which socio-economic base of a society evolve. The roles of good health system are numerous; for one, an adequate health system guarantee overall physical, social, and mental health status of a society. This is with its attendant effect particularly in the productivity level of such society and as International Labour Organization (2014) observed, nations that have more generous social protection system have a better population health. Second, an ideal health system can assist in the prevention of disease and disability.

Where a society is abreast of health education, there is tendency that, health system may not face challenges of passing on information on the prevention of certain diseases. Third, a well-equipped health system can detect and treat health conditions, which can snowball to a widespread problem. In Nigeria, the Federal Government of Nigeria has set up a unit charged with the responsibility of giving quick response to outbreak of any disease in part of Nigeria. The success of this unit is felt in area of disease outbreak reportage. Health system can also assist in the area of improving quality of life. This possible through advocacy particularly in areas where literacy is low. Illustrative posters and bills are printed to teach and enlighten people the ideal ways of doing certain things.

A good health system can prevent deaths. This can be achieved through adequate health education. A good example that comes to mind is the immunization of children against killer diseases many parts of the world. This has been incorporated into health programmes of many countries of the world. Lastly, a well-equipped health system can increase life expectancy of people.

Available literature has shown that life expectancy varies from one country to another, leading to inequality in health accessibility between countries. In Nigeria the life expectancy is 45years. This may be linked to a number of factors, among which may be inaccessibility to safe water, a trend that discourages development. Inequality among the people has created poverty and poverty according to WHO (2012) has many dimensions. Poverty is manifested in deprivation of food, shelter, sanitation and safe water, the aggregate of which can work together to reduce opportunities, undermine hope, limit choices and as a result threaten health. Suffice to add that safe health opportunities vary from one country to another. CDC (2013) affirmed that, the disparity in health care stem from socio-economic advantages.

In most developing countries, accessibility to safe water is major attractant to waterborne diseases.

However, Ajala et al (2005) are of opinion that improved health and quality of life depends to a great extent on the availability of and accessibility of health care facilities at affordable cost. Globally, the poor particularly those in the rural areas do not have access adequate health facilities. Ajala et al (2005) in their study of accessibility of rural of Osun State of Nigeria affirmed that there is disparity in the availability of health facilities between rural and urban areas.

Oyebanji (2014) submitted that, despite various reforms in the health sector, only 43.3% of Nigerians have access to health facilities. The ineffectiveness of this has been attributed to many factors. Duru and Nwagbos (2007) attributed failure recorded in the Nigeria health care system to demographic nature of Nigeria. Over 55.0% of population lives in the rural areas, while 45.0% are in the urban areas. For the same population, 70.0% of the health care is in the hand of private care givers, while 30.0% is serviced by the government. Private care givers are out to make profit without prejudice to the quality delivery. Erhun, Babalola and Erhun (2010) identified the singular factor of influx of substandard drugs into the Nigerian health sector as being responsible for flaws. According to them, over 70.0% of the drugs are substandard.

The National Health Insurance Scheme (NHIS) that has been put in place to check these lapses is also small in scope as it does not represent more than 40.0% of the population. It is also important to know that high cost of health care in Nigeria has also worked against health care system. Over half of the population lives below the poverty line of US\$1.25 per day, which is not enough to foot any medical bill when the need arises. Lastly, Nigeria health care system has not incorporated disease tracking as a means of detecting disease outbreaks.

2.4.12 Overcoming Disease Challenges: The Way Out.

Many works have pointed out the adverse effects of disease in the human society (Adejuwon, 1978; Yvan, et al, 2003; Ajala et al, 2005; Oguntoke et al, 2009; Garba et al, 2011). As a result of the foregoing, it therefore becomes imperative to channel the way forward. Dickson (2011) suggested that programmes of action should emphasis continuous research into transmission pathways.

For example, Malaria infection has been checkmated through robust scientific discovery and this has assisted to put global eradication of the disease within the grasp. In eradicating malaria, the use of insecticides and mosquito net, were discovered to be effective in curtailing menace of mosquito. When scientific discoveries are made, another way forward is to encourage the use of research findings. This too can be achieved through political will in relation to provision of finance and trained personnel. As a way forward, it is suggested that animals' companion or wild should be considered in the formulation of health policies.

Literatures have shown that animals can host diseases, thus where these animals are consumed or kept as pets, there is likelihood for incidence of diseases (Parrish, Holmes, Moren, Park et al, 2008). As a way, out challenges in disease eradication can be achieved through using inter-sectoral and interdisciplinary efforts. It is suggested that veterinary health officers and other professionals should always be part of eradication teams. In facing the challenges of disease Cromly (2003) suggested the use of Geographic Information System (GIS) in tracking diseases. This involves relying on data from water and health sector. According to Simoonga, Utzinger, Brooker et al (2009), this method has been used in studying *Schistosomiasis* in Africa.

Larsoon (1991) submitted that, UNICEF has used this method in many Francophone African countries, and it has been found to be useful. The tracking model can rely on Management Information System (MIS) for its function. The model can file out reports, send requests, issue alerts, perform several system commands and have several databases access.

In complementing tracking method suggested above, especially where the technology and finance is barrier, surveillance unit should be established to among other things give report of disease occurrence in any part of a country. In Nigeria, for instance the Federal Government of Nigeria through its Ministry of Health has set up, the Integrated Disease Surveillance and Response. Its work includes surveillance and quick response all to disease outbreak within the country. Cairncross et al (2002) opined that, because of distance of health care centers, some hospitals are aware of existence of diseases in an area close to them. Currently there is disparity in the availability of health care facilities between the rural and urban areas (Ajala et al, 2005).

In Nigeria for instance, urban areas enjoys more health facilities than the rural areas, though the later house more people(Duru and Nwagbos, 2007). Where these facilities are in place, they should be well equipped and everything that inhibits people's visit to such center should be removed. However, coupled with the above the need for health education is central to the achievement of eradication of disease.

Occurrence and subsequent spread of diseases have been aligned to the apathy of the people. Where government has failed to make available certain infrastructure, people can harness the available potentials to safeguard the existing one.

A report by (WHO, 2014) have shown that unsafe water is a major cause of many diseases. The effects of this manifested in myriads of stagnation of socio-economy with its problems. As a major way of facing challenge of diseases, provision of safe water is a necessity as saving money to take care of other troubled sectors, a disease free society is the one that can align itself to committee of nations.

Cairncross et al, (2002) affirmed that, some communities do not forge their energies in fighting diseases and this has resulted in spread of many diseases. Suffice to add that, the rate at which the population is growing without corresponding increase in the supply of safe water may continue to encourage the occurrence of waterborne and other related diseases. The world attained its 7billion people in 2011, growing at a rate that is not correspondent to the infrastructure that can prevent diseases.

Population growth has also led to pollution of the environment. Infections from water, accounts for about 80.0% of all the infections globally, while unsanitary living condition account for 5million deaths yearly, half of which are children (Adewusi, 2012). Population growth has led to short supply of food, thus people are forced to take any available food, without prejudice to its nutrient content. It follows therefore that, in order to prevent disease in any form; diets that contain moderate nutrients should be given priority in our daily intake (FAO, 2007).

Similarly, as the population grows, man has continued to clear vegetation for his housing and industrial needs. The effect is that the earth surface is exposed to direct effect of sun and its associated problems. This singular act has succeeded in degrading our environment, and combined with population growth have led to increase inhuman diseases.

For a disease free society therefore, the number of people born into the world must be controlled. Diseases can equally be prevented, if our life style choice is moderated toward a more acceptable social behaviour, so we can prolong our lives. This may result from consumption of excessive alcohol and highly processed foods. In achieving healthy living, free of diseases, human body requires steady supply of micronutrients such as vitamins, minerals, and enzymes (Kim, 2008).

2.4.13 The Phenomena of Major Waterborne Diseases.

Even though how many cases of waterborne diseases is a matter of estimates, the fact is that, waterborne diseases constitute a major health issue. This may be partly because of the burden it places on the victims and wholly, because of the responsibility on the government. Records have shown that, typhoid is one the waterborne diseases that has been cog in the wheel of progress of the people.

Centers for Disease Control (2013) affirm that typhoid is common in developing countries. It is a waterborne disease that can be contracted through drinking contaminated water. Globally, CDC account furthermore that typhoid affects about 21.5million people annually, resulting in 200,000 deaths annually. Iperepolu, Entonu, and Agwale (2008) affirmed in their study of the diseases in Nigeria that, typhoid portend a burden on Nigeria. This can be curtailed through good sanitation, provision of safe water and provision of proper sewage disposal system.

WHO (2014) has described diahorea as one of the major waterborne diseases that is unique to tropical region of the world. It is described as an increase in the looseness of stool. It is transmitted through the consumption or contact with contaminated water and inadequate sanitation and hygiene. According to WHO, there are two types of diahorea--acute and absolute.

Diarrhea is said to be acute when there is increase in the looseness of stools compared with an individual's usual bowel habit. On the other hand, diahorea is said to be absolute, when there is more than five stools per day. Diarrhea kills about 1.8million people yearly and over 90.0% of children under 5years in developing countries die of diahorea.

It is equally estimated 88.0% of diarrhea cases are attributable to unsafe water, inadequate sanitation and hygiene.

Another common waterborne disease is cholera that is contracted through contaminated water. Cholera is an acute form of diarrhoea infection caused by ingestion of contaminated water. CDC (2013) submitted, that at the beginning of 21st century, 300,000 people were affected out of which 10,000 died. In 2011 alone there were about 589,854 cases in 58 countries and 7,816 deaths. The period 2010-2011, witnessed 2,000 cholera deaths in Nigeria. Cholera disease has remained a global threat to public health, yet remains treatable and eradicable with adequate sanitation and provision of safe water, back up with health education.

Onchocerciasis is also otherwise known river blindness CDC (2013) affirms that, *Onchocerciasis* is mostly confined around sub-Saharan Africa. The disease is transmitted through bite by female black fly and this manifested through skin nodules or skin scrapings. Globally, over 140 million people, out of 37million live in sub-Saharan Africa. The NPC (2009) agreed that, over 40million Nigerians were suffering from *onchocerciasis*. There are three types of *Onchocerciasis* and these according to James, Elston, and Odon (2006):-

- i. *Erisipela de la costa*- this also characterized by swelling face and itching
- ii. *Mal marando*- this characterized by skin inflammation.
- iii. *Sowda*-this depend on the available *onchocerciasis*.

Pertinent to know that, the federal government of Nigeria has set up national committee on *onchocerciasis*.

According to CDC (2012), *trypanosomiasis* which is also referred to as Human African *Trypanosomiasis* (HAT) or sleeping sickness. It is common in many African countries, where an estimated 30,000 people are suffering from it.

In Nigeria, it is estimated that 30,000 people are suffering from this disease (WHO, 2014). This may have prompted the Federal Government of Nigeria to set up Nigeria Institute for Trypanomiasis Research. There are two types of *trypanosomiasis*, but the most common in west and central Africa is *Trypanomiasis brucei gambiense*, which account for about 98% cases in the region.

Schistosomiasis is another waterborne disease that has caused deaths of thousands in sub-sahara Africa. It is also known as bilhazirziasis. It was discovered by a German Theodor Bilhzar 1851 and it can be contracted through swimming in contaminated water and the transmission is mostly through snail. There are at least 19 species of this disease, out of which according to Carter Center two are common in Nigeria- *schistosomia haemobium* and *schistosomia mansoni* WHO (2014) affirms that, there about 200million cases of *schistosomiasis* globally, resulting in 15,000 deaths yearly in Africa. Carter Center affirmed that Nigeria is most endemic country in Africa affecting 20million people.

CHAPTER THREE

THE STUDY AREA AND METHODOLOGY

3.1 THE STUDY AREA

3.1.1 Location

Kwara State is located between latitudes $8^{\circ}00'$ and $9^{\circ}10'$ north and longitudes $2^{\circ}45'$ and $6^{\circ}40'$ east. The state is bounded in the north and east by River Niger, while it share boundary in the south with Oyo, Osun and Ekiti States. Similarly, Kwara State share boundary with Kogi State and Benin Republic to the east and west respectively (Oyebanji, 2000). Administratively, Kwara State is divided into sixteen (16) Local Government Areas (Figure 3.1). The Local Government Areas are further divided into 193 wards, and these also vary from one Local Government Area to another (Ayanda and Shaaba,, 2001).

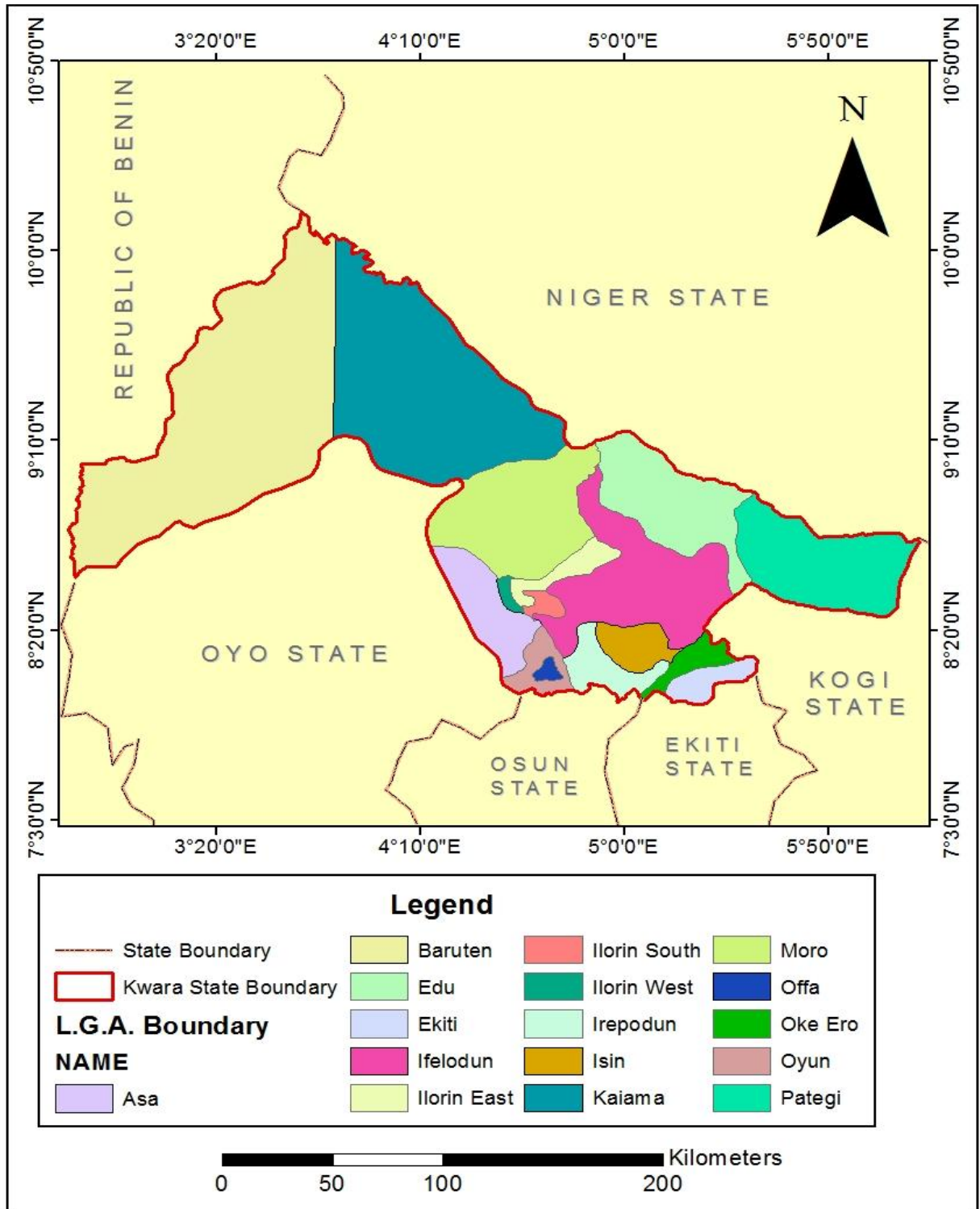


Figure 3.1: Map of Kwara State.
Source: Kwara State Town Planning, 2012.

3.1.2 Relief and Drainage.

Kwara State with its size has both highland and lowland. The landform consist of undulating hills, valleys and plains , the highest of which is found across the length and breadth of the state (Oyebanji,2000). The state has an elongated shape that cover about 32,500sqkm with interspersed hills and valleys in part of Baruten, Kaiama and Moro Local Government Areas. The most outstanding landforms in the state are the Sobi hill in Ilorin-East Local Government Area, Oke-Agbanna hill and Owu waterfall in Ifelodun Local Government Area and a handful of hills close to Kaiama town. The state is also drained by many rivers, chief among which is River Niger. Others include rivers Asa, Moro, Moseh, Ero, Oyun, and Osin, all of which has been harnessed for water supplies to towns and villages. Many of these rivers have also been utilized for agricultural purposes.

3.1.3 Climate

There are two main seasons (dry and wet) seasons in Kwara State. The wet season commences towards the end of March in the southern part and ends towards the end of October in all the parts of the State. The dry season on the other hand begins in November with some pocket of rainfall and last till late March. The mean annual rainfall ranges from 1000mm -1500mm while the mean temperature ranges between 30⁰C and 35⁰C (Oyebanji, 2000).

3.1.4 Vegetation

There is a kind of umbilical relationship between climate and vegetation in this state. According to Encyclopaedia Britannica (2014), the vegetation is made up of rain forest and wooded savannah.

The rain forest has trees like Iroko, Opepe and other trees are use. The wooded savannah is however confined to the central and northern parts of the state. Notable trees in these areas are locust bean, akee-ape and Shea butter. There are other fringe forests along the river banks. Common grass species found in this area include elephant grass (*Pennisetum Purpurenum*), goat weed (*Argeratumconyzoids*), tridax grasses (*Trdaxprocumbens*), Wild hemp (*Sidaacuta*) among others.

3.1.5 Soil

The soil type in Kwara State is lateritic in nature .It is reddish or brownish due to high content of iron. They contain stones of various sizes and are sticky when wet and hard when dry. The soils are derived mainly from the basement complex formation and other sedimentary rocks and are rich in nutrient, good for the cultivation of yam, rice, maize, wheat, millet, cotton and groundnut. However, the fertility of these soils is being lost to erosion and unhealthy human activities, such as overgrazing and over cultivation (Oyebanji, 2000)

3.1.6 Peoples of Kwara State

Kwara State is a heterogeneous state with many tribes with population of 2,365,353 million people; this made up of 1,193,783 Males and 1,171,570 Females (Federal Government of Nigeria Official Gazette, 2007). This population is projected to go up to 2,853,160 people (United Nation Fund for Population Activities-UNFPA, 2015,). According to an online post,Yoruba is the major tribe and widely spoken language. The other tribes are Nupe, Fulani and Baruba. Whereas the Yorubas are spread from the entire south and central parts of the state, the others are confined to the northern part.

In spite its multi-ethnic nature, Kwara State has made progress in its socio-economic sector (www.onlinenigeria.com/links/kwaraadv)

Large percentages of Kwarans are Muslims, but Christian population is significant. There are other African traditional religions faithful. There is Awon mass wedding festival in Shao and Elewe Masquerades among the Igbomina(A Yoruba dialect).Equally of importance is the Ghani festival among the Bokobaris and Barubas in the Northern part of Kwara State. The Rigatta festival is also common among the Nupes.

3.1.7 Socio-Economic Activities

Kwara State is a multicultural state, with about 80% of the people dwelling in the rural areas (Oyebanji, 2000; The National Institute, 2006). The people are largely farmers; the crops they grow include rice, yam, okro, cassava, cocoa and equally of importance is the raising of livestock. The climate and soil variation of the state are the two major determinants of agricultural practices in the state. While livestock thrives in the northern and central parts of the state especially in Baruten and Kaiama Local Government Areas, the passage of River Niger through the State, has led to establishment of rice mill at Duku Lade in Patigi Local Government Area by the Kwara State government. Cocoa and forest agricultural products are also available in the southern part of the state, where rainfall is available for such agricultural products.

3.1.8 Industries

Few industries also exist mostly in state capital, Ilorin. According to Kwara State Ministry of Industry and Minerals (2013) some industries exist in the state capital and these include Dangote Flour Mills, Chelleram, Olam Nigeria, Global Soap and Detergent Industries, Nigeria Bottling Company, Tuyil Pharmaceutical Industries, Lubcom and Kwara Ethnix.

The paper mill at Jebba and sugar Company at Bacita have closed and it is being privatized.

Suffice to add, the state is served by network of rail that passes from the south to the northern part of Nigeria, the relevance of which cannot be overemphasized. Electricity is also in supply to many towns in the state and with the construction and Commissioning of an independent Power plant (IPP), it is believed that large part of the state will enjoy this facility, thus encouraging industrialization of the State.

3.1.9 Water Infrastructure

Kwara State is a house to many dams and weir that serves both state capital and other towns in the state (KWASEED, 2005). River Asa has been dammed to provide water for the residents of Ilorin. The Asa and Aagba dams are both located in Ilorin town with water capacity of 4 million and 2 million gallons per day respectively. Furthermore, river Moro has also been dammed, with water capacity of 60,000 gallon per day and it provides water for Army Barack, Shao and its environs. In the Southern part of the state, River Oyun was dammed to provide water of about 20,000 gallon per day for the people of Offa and its environs (Kwara State Ministry of Water Resources, 2011). In all about twenty four dams and weirs are presently serving people of the State. There are also boreholes that are sited in all the nooks and crannies of state, but regrettably about 46% of these boreholes are non-functional (KWSPC,2006; Aganaba, 2006)

3.2.0 Health Care Delivery System

Health is a major determinant of productivity in any society. In accordance with the National Health Policy in Nigeria, Kwara State operates three tier structure of health care facilities-primary, secondary and tertiary(FMH,2004).

Table 3.1: Distribution of Health Facilities by LGAs in Kwara State.

LGAS	Tertiary Hospital	Secondary	Primary	Private
Asa		3	18	9
Ilorin-West		3	17	21
Ilorin –East	1	4	18	19
Ilorin –South		3	8	17
Moro		4	17	20
Baruten		3	19	9
Kaiama		1	10	10
Edu		5	22	8
Patigi		3	15	9
Ekiti		2	9	8
Oke-Ero		2	3	7
Irepodun		8	19	15
Ifelodun		7	23	18
Oyun		4	10	14
Offa		1	17	8
Isin		3	12	8
Total	1	56	237	200

Source: Kwara State Ministry of Health, 2012.

3.2 METHODOLOGY.

This section describes the various methods adopted in obtaining and analysing data for the study. It consists of reconnaissance survey, types of data, sources of data, sampling size and sampling technique and method of data analysis.

3.2.1 Reconnaissance Survey

As a precedent in the collection of data for this study, a reconnaissance survey of the study was carried out in order to have some background knowledge of the area. Because of the cost and size of the area, the reconnaissance exercise was carried on separate days in the sampled areas in the senatorial districts. During the reconnaissance survey, sampled areas, during which settlements making the administrative districts were confirmed through house heads, target population were selected and preparations were made for FGDs.

3.2.2 Types of Data

Data used in this study were both quantitative and qualitative in nature. The quantitative data were numerical data obtained from questionnaire and other published and unpublished sources. On the other hand, qualitative data were also obtained from interviews, and FGDs; qualitative data were not numerical in nature, but were useful as complements in the analysis of quantitative data.

3.2.3 Sources of Data

In order to achieve the objectives of this study, data used for this study were obtained from primary and secondary sources.

3.2.3.1 Primary Sources

The study obtained quantitative data from primary sources through in-depth interviews, Focus Group Discussions (FGDs) and questionnaire administration. These are explained further below.

(a) In-depth Interview

In-depth interviews were conducted among household heads, faith and community based leaders and personnel of Kwara State Ministry of Health. These people were considered very important to the study either as informed public opinion leaders or people familiar with the subject matter. The data obtained here were quantitative in nature.

(b) Focus Group Discussions (FGDs)

This is a participatory method that is utilized for this study. Focus Group Discussion (FGD) is important for this study for a number of reasons.

First, it affords a researcher the opportunity to qualitatively understand issues that cannot be explained statistically. Second, FGD has the potential to discover the range of opinion on a topic and issue. Thus, ten Focus Group Discussions (FGDs) were conducted, two per Local Government Area (LGA). In all, 120 participants interacted on their knowledge of waterborne diseases, the factors that facilitate their transmission, the effects, and level of their prevalence in relation to sources of water and sanitation. This indicates that, 20 people per Local Government Area. The number of participants was limited to 20 people per Local Government Area because of cost, language barrier and other logistics. The participants were assembled at the headquarters of selected local government areas i.e. Afon, Oke-Oyi, Bode-Saadu, Kaiama, Share and Iloffa on different dates. The participants were, selected based on their experience as health service providers of many years and their other attributes. The discussion was based on subject matter and the target population here is household heads.

(c)Questionnaire

In carrying out this study, the questionnaire designed was divided into four sections-A, B, C and D. Section A was used to obtain relevant bio data of the respondents reflecting ages, occupations, marital status, education, income, types of accommodation and residence. On the other hand, Section B focused on issues relating to the knowledge of respondents of waterborne diseases, its prevalence, coping strategies, and trends among others. Section C of the questionnaire was used to obtain data on the effects of waterborne diseases while section D was on success/failure of government initiatives aimed at eradicating waterborne diseases (Appendix 1)

3.2.3.2 Secondary Sources

These are information already existing in form of publications (published and unpublished) and at times in data banks. For this study therefore, secondary data were obtained from agencies and parastatals such as Ministries of health, planning and economic development and some non- governmental agencies.

Other materials for literature review were from books, newspapers and archival sources. The key secondary information that are related to waterborne diseases, potable water and sanitation were sourced from UNICEF, WaterAid, and Epidemiology unit of Kwara State Ministry of Health, Ilorin.

3.3 SAMPLING SIZE AND SAMPLING TECHNIQUE

The study adopted multi-stage sampling method. Multi-stage sampling method is a sampling method in which sampling is done sequentially across two or more hierarchical levels (Battaglia, 2008). Multi-stage sampling method has the advantage of reducing travelling time for discussions, which eventually reduces the cost of survey. Additionally, multi-stage is flexible, as it allows the researcher to use other sampling methods e.g. cluster, random and stratified methods. The method allows the researcher to breakdown groups and sub-groups into the desired size. Lastly, no restriction is placed on how researchers divide the group (Okoko, 2000).

The study area has 16 LGAs which are Asa, Baruten, Edu, Ekiti, Ifelodun, Ilorin –East, Ilorin-West, Ilorin South, Irepodun, Isin, Kaiama, Moro, Offa, Oke-Ero, Oyun, and Patigi. The study area was divided into cluster on the bases of the existing senatorial districts— Kwara North, Kwara Central and Kwara South Senatorial Districts.

Four stage sampling method was adopted in the selection of sample size for this study. The first stage sampling involves picking two local government areas each purposively from the three senatorial districts (Table 3.2). They were purposively chosen because of level of prevalence and occurrence of identified waterborne diseases in the area.

The second stage is the selection of settlements that make up the administrative districts in each local government area (Table 3.3). These administrative districts are germane to the sampling procedure, because they have remained unaltered over the years in Kwara State unlike the local government areas (LGAs). Suffice to add that, in identifying the settlements that make up the districts, the Nigeria 1991 population census data was utilized to identify and determine the number of localities that make up the districts (Table 3.3). The Nigeria 1991 population census data is used, because it is the only Nigerian population data disaggregated into localities.

Table 3.2: Senatorial Districts and Sampled LGAs in Kwara State.

Senatorial Districts	LGAs	District	LGAs Sampled	District Selected
Kwara North	Moro	Oloru Ejidongari Lanwa Ipaiye Malete	Kaiama	Kaiama
		Afon		
Kwara central	Asa	Onire	Ilorin East	Magaji-Are
		Owode		Balogun, Gambari, Ibagun, Sango
		Share Igbaja Oke-Ode		Ilofffa/ Odo-Owa Idofin Ekan
Kwara South	Ifelodun	Idofian Omupo Oro-Ago Ile-Ere	Oke-Ero	

Source: Ayanda and Shaaba, 2001.

The third stage in the sampling process involves, picking of 10.0% of all the settlements in each district, constituting the sampled settlements. The use of 10.0% is to ensure precision and adequate representation of the sampled settlements by avoiding bias in the distribution of questionnaire in the purposively selected settlements (Table 3.2)

Table 3.3: Sampled Households and Distribution of Questionnaire in the Study Area.

SENATORIAL	Districts	Number of Settlements	Sampled Settlements(SS)	Estimated Household= (SS × Mean HH (4.7*))	Sampled Size
KWARA NORTH	Oloru	46	5	24	45
	Ejidongari	30	3	14	27
	Lanwa	85	9	42	79
	Ipaiye	11	1	5	9
	Malete	12	1	5	9
	Kaiama	63	6	28	53
	Total		247	25	118
KWARA CENTRAL	Afon	72	7	33	62
	Onire	20	2	9	17
	Owode	50	5	24	45
	Iponrin	60	6	28	53
	Magaji-Are	15	2	9	17
	Balogun/Gambari/Ibagun/Sango	10	1	5	9
	Total		227	23	108
KWARA SOUTH	Share	23	2	9	17
	Igbaja	17	2	9	17
	Oke-Ode	20	2	9	17
	Idofian	11	1	5	9
	Omupo	20	2	9	17
	Oro-Ago	9	1	5	9
	Agunjin	13	1	5	9
	Ora	11	1	5	9
	Ile-Ere	12	1	5	9
	Iloffa/Odo-Owa	40	4	19	36
	Idofin	40	4	19	36
	Ekan	60	6	28	54
Total		276	27	127	239
Grand Total		750	75	353	664

Sources: Author, 2012.

The fourth stage is the selection of respondents in the settlements that make the study area. The respondents (Households) were estimated using the National Population Commission (1991) estimated that 4.7 as the mean household for each settlement in Kwara State (as at 1991). There is no known Nigerian population data that contains estimate on household. In all, 664 samples were administered on 353 households. Kwara South Senatorial district has the highest number of households of 127, while Kwara North and Central Senatorial districts have 118 and 108 respectively. The number of samples administered in each senatorial district is also dependent on the number of estimated households (Table 3.3). The questionnaires were administered in the purposively sampled settlements with the help of 45 trained research assistants (Appendix 13)

3.4.1 Method of Data Analysis

The study adopted both qualitative and quantitative approaches to analyze data. For the presentation of results, descriptive statistical methods such as tables, percentages, charts and graphs were used. In order to establish the relationship between water borne diseases and demographic variables in the study area t-test was also used to test level of significant difference in perception of sex on waterborne diseases. ANOVA was also used test if there is significant difference between waterborne diseases and other demographic variables such as education, income and age. Descriptive statistics was adopted to test the significant difference on perception of six waterborne diseases across the senatorial districts. Similarly, correlation analysis was equally used to test the level of waterborne diseases in the senatorial districts. Lastly, crosstabulation was used to test the relationship between waterborne diseases and demographic variables.

Decision rule: we reject H_0 when the P-value < level of significance (0.05)

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

Introduction

This chapter presents data analysis and discussion of the results on socio-demographic characteristics of the respondents. The socio-demographic characteristics is related to sex, age, marital status, number of wives, educational attainment, occupation, children ever born and income per month

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

4.1.1 Sex.

Gender is central to the making of human society. The sex ratio determines the number of children and invariably the workforce of a country.

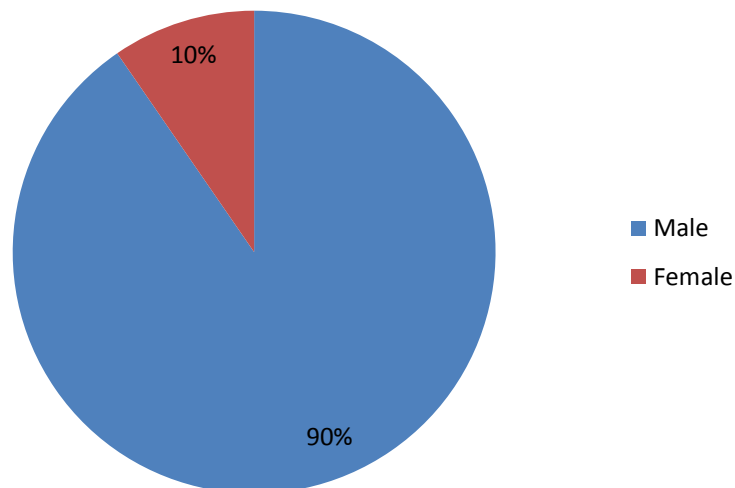


Figure 4.1: Distribution of Respondents according to Sex
Source: Field Survey, 2012.

The profile of respondents on Figure 4.1 shows that 90.4% of respondents are males, while the remaining 9.6% are females. It may also reflect the role of Africa man as the head of household, on whom information about the family lies.

This view is supported by a participant during one of the FGDs:

“From my experience over the years in many parts of Nigeria, headship of house is mostly men affairs, except in few cases, where the household do not have male children. Women are not allowed to take decisions on behalf of men as they are considered unAfrican.”(A retired Civil Servant, Alasapa, Kaiama LGA, 2012).

This same view has been supported by a woman participant who averred that:

“As an African woman and with particular reference to her area, women are not allowed to play a front role in family decision, except in exceptional cases such as the death and desirability of male in the house. In such exceptional cases, aged women may have a say and these sayings are passed through men from other relative houses.”(FGD, Alasapa, Kaiama LGA, 2012).

These views have been supported by Varga (2001) and Omadjohwoefe, (2011) who also explained the dominant role of men in many Africa communities, in terms of representation and decision making. Provision of water, food and shelter are duties of men, women only facilitate them in the study area. This too may explain one of the reasons for the responses, as the saying goes, “He who blow the pipe dictates the tone.”

4.1.2 Age

The age distribution of the respondents is an important attribute in geographical discussions, because all human activities are dependent on age. For instance, collection of water for domestic use and decision making are responsibilities that have to do with age.

Table 4.1: Distribution by Age of Respondents.

Age Group(Years)	Frequency	Percentage (%)
<15	0	0.0
15- 19	0	0.0
20-24	5	0.8
25-29	4	0.6
30-34	20	3.0
35-39	30	4.5
40-44	80	12.0
45-49	152	23.0
50-54	200	30.1
55-59	90	13.5
60-64	45	6.8
>65	38	5.7
Total	664	100.0

Source: Field Survey, 2012

According to Table 4.1, 0.8% of respondents (which is the lowest) fall within the age range of 20 and 24years, while the age between 50 and 54years. Age is a predictor of physical health, however, such an active population can be beneficial if they have access to safe water; thus without prejudice age, safe water for all age group can have multiplier effects on socio-economic development. The active age that interacts with water vis-avis sourcing for domestic, utilization on the farm are over 90.0%. The implication is that, where the water are sourced from unsafe places (as it is in the study area), water related diseases will always thrive in the area.

4.1.3a Marital Status

Marital status is the state of whether a person is married or unmarried. In some cultures, marriage is not considered to be important; however in African society, family status is determined by whether a person is married or not

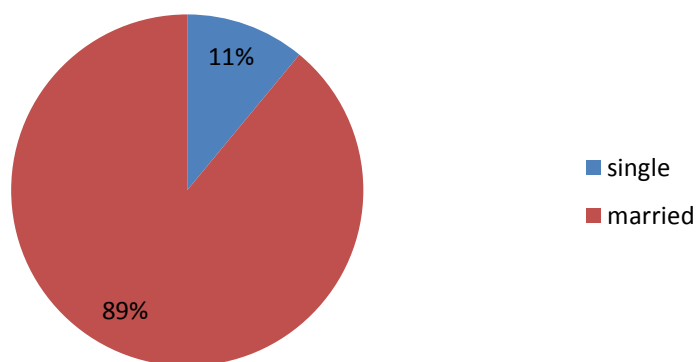


Figure 4.2: Distribution of Respondents by Marital Status
Source: Field Survey, 2012.

Figure 4.2 shows that 89.0% of respondents were married, while 11.0% were not married (Singles). The respondents in the category of not married include divorcees or widow/widower of spouses, who have refused to remarry after such separation or losses.p

4.1.3b Distribution of Respondent by Marital Union

Figure 4.3 shows that 5.0% and 15.0% of respondents have a wife and two wives respectively, while 47.0% have three wives and 33.0% have four wives.

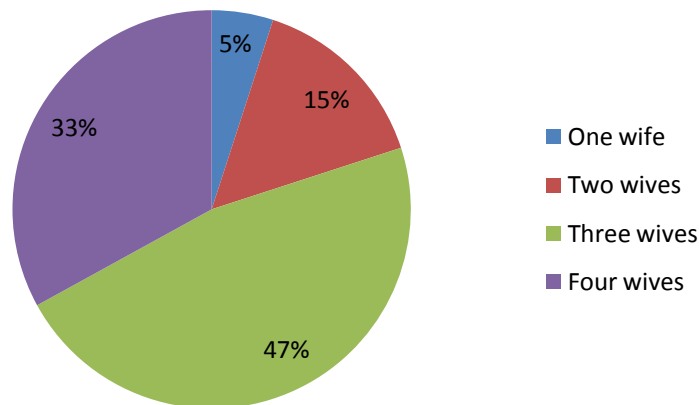


Figure 4.3: Distribution of Respondent by Number of Wives
Source: Field Survey, 2012.

This structure of marital status has its footing in Islamic teaching which is practiced by many in the area under study, without prejudice to socio-economic realities.

In one of the FGDs, a respondent opined that:

“We cannot do with a wife, because apart from Islamic injunction which enjoins us to marry as many as four, polygamy is also an asset for us because of farming, which many of us are engaged in”. (FGD, Oke-Oyi, Ilorin East LGAs, 2012).

This practice is considered in the light of the occupation of many respondents, without considering the socio-economic implications, particularly the effects of population growth with its attendant problems. Larger parts of the study area are Muslim dominated area, with the doctrine of polygamy. Additionally, the bucks of people of the study area are farmers that rely on their children for their workforce. Thus the number of wife a man has, determines the number of children and workforce on their farms.

4.1.4 Educational Attainment

Education is a major determinant of lifestyle and social status of a person. It is one of the indices of measuring human development, as formal education enhances ability to discern between living in sanitary conditions, that are free from diseases. Ability to read and write is a personal asset, thus it assist how individual view aspect of life (NPC, 2009).

Table 4.2: Distribution of Respondents by Educational Attainment.

Educational Attainment	Frequency	Percentage (%)
Non-Formal/Adult Education.	180	27.1
Islamic	40	6.0
Primary	27	4.1
Secondary	106	16.0
Tertiary	93	14.0
No Educational Background	218	32.8
Total	664	100.0

Source: Field Survey, 2012.

The breakdown in Table 4.2 shows that 32.8% are without formal education, while 67.2% are formally educated.

The analysis indicates a fairly educated society, which means that dissemination of information regarding the harmful effects of waterborne diseases and their remedies will not pose a major problem. In an interview, a community leader in one of the communities under study that is knowledgeable of Kwara State opined that:

“Because of low level of education in the area, virtually all aspects of the development in the area is retarded”.(IDI, Idofin-Odo-Aga, Oke-Ero LGA, 2012).

This assertion is confirmed by National Population Commission (Nigeria) and RTI International (2011) 53.0% of children age 5-16years are not able to read and write in the study area. Bearing in mind the relationship between education attainment and general attitude of people, acceptance of innovative ideas may not achieve the desired objectives.

The implication is that no matter how viable a waterborne disease programme is; its impact may not easily be felt. For example, an educated person may discern the effects of consumption of contaminated water and its effects than somebody that is not educated.

4.1.5: Occupation

Occupation is highly related to the people's social economic status. It determines the type of earning and essential of life such as health facilities, potable water, decent accommodation, relevant education among others (Burgard, Stewart and Schwartz, 2002).

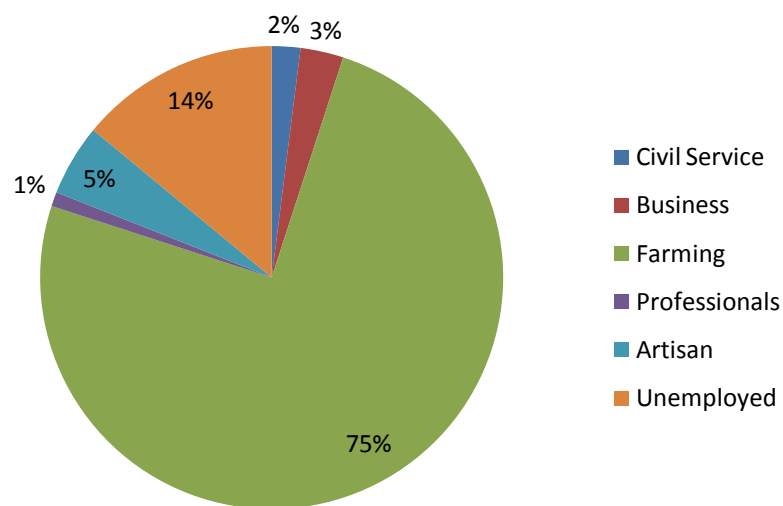


Figure 4.4: Distribution of Respondents by Occupation.
Source: Field Survey, 2012.

In Figure 4.4 reveals that 75.0% of respondents are predominantly peasant farmers. Most of the respondents are people that settle in the study area, on whom information on the houses vis-avis health, economy among others lied. While, 1.5% are civil servants, and are made of teachers, and nurses. The professionals and artisans (Carpenters, tailors, auto mechanic, driver, plumbers,) constitute 1.1% and 5.1% respectively, and 13.8% are civil servants, who are mostly teachers, nurses, among others. Unemployed constitute about 14.0%, a fact corroborated by NBS (2010).The nature of occupation in the study area, reveals that majority are peasant farmers, with small size farms and low agricultural turn out.

Little wonder then, that there is economic degradation, that accessibility to potable water a mirage in the study area.

4.1.6: Children Ever Born

In African society, the number of children born into human society is a social activity, which can be used to measure the socio-economic status of a people. In any society where more children are born in addition to the existing population without corresponding increase in other facilities, would always create a worse scenario.

However, the number of children ever born is useful in measuring the family size. In this study, family sizes are also employed to explain certain characteristics of the study area.

Table 4.3: Distribution of Respondents by Children Ever Born.

Number of Children	Frequency	Percentage (%)
1-2	120	18.0
3-4	198	30.0
5-6	144	21.6
7-8	89	13.4
9 and Above	59	8.9
Never had a child	54	8.1
Total	664	100.0

Source: Field Survey, 2012.

Table 4.3 reveals that, 48.0% of respondents have had between 1-4 children. Most of respondents in this category are education and are believed to be abreast of the effects of having many children. Similarly, 8.9% of respondents have 9 and above children and 8.1% have never had children. Most of respondents with more than 9 children are farmers and polygamous, while respondents who never had children were spinsters or are barren.

In a FGD, a discussant who has many children averred that:

“As a Muslim, Islam encourages Islamic adherents to bear many children, so that horizon of Islam can be broadened. So if we bear few children, how do we achieve this tenet” (FGD,Pasa, Asa LGA,2012).

Because of the nature of occupation of people of the study area, having many children is considered an asset. With many children, there will be enough hands to work on the farms. A man without a child is considered an aberration. From the Islamic angle, Muslim are enjoined to marry as many wives as four. Larger parts of this area are not exempted from this injunction and this may explain why some have more than 9 children. However, another school of thought has a contrary view. For instance, in an interview with a retired nurse, it is believed that:

“Too many children can further aggravate the already existing poverty with its negative effects on the system. From experience, uncontrolled child bearing has led to inability to meet the necessities of life”. (IDI, Asa LGA, 2012).

Suffice for me to say that, among the Christians and educated in the area, polygamy is considered a burden. They mostly constitute those respondents with 1-4 children.

4.1.7 Income

Income is an important indicator of the socio-economic and health status of a people, therefore information on respondents' monthly income is also obtained.

Table 4.4: Distribution of Respondents by Income per Month.

Monthly Income(₦)	Frequency	Percentage (%)
Less than 5,000	378	57.0
5,000-10,000	133	20.0
11,000-15,000	67	10.1
16,000-20,000	53	7.9
21,000 and above	33	5.0
Total	664	100.0

Source: Field Survey, 2012.

Data on Table 4.4 reveals that, 57.0% of respondents earn less than ₦5, 000 per month. Respondents in this group are mostly peasant farmers and petty traders, while, 5.0% of

respondents receive over ₦21, 000 monthly. Respondents in this category are made up of senior civil servants and fairly successful artisans. This infers that, more than half of the respondents receive less than ₦170.0 per day, which translates to US \$1.13 per day. This fall short of US \$1.25 or ₦187.5 recommended for an individual by the World Bank. The implication is that, availability of disposable income might be too meager and this may have negative implications for the socio-economic development of the area. Furthermore, where disposable income is lacking, accessibility to potable water and other essentialities of life may be difficult.

A retired civil servant averred that:

“Economic power is central to human development; however most part of our area is suffering from economic stagnation and this is manifested in low development in all sectors”.(IDI, Aiyedun, Oke-Ero LGA,2012).

Income is central to the attainment of many things in life including water, house, and health facilities. A person, whose income can afford him to access clean water or house, may not go for an unclean water or house. But reverse may be the case with somebody with little or no income. Majority of respondents in the study area earns less than 5000 naira per month from the sales of their farm products. Even in a situation where government fails to supply social amenities, this meager income is not enough to embark on self help project. Therefore it can be deduced from the foregoing that, income is one of the promoting waterborne diseases in the study area.

4.2 KNOWLEDGE OF RESPONDENTS ON WATERBORNE DISEASE

Table 4.5: Distribution of Respondents by Knowledge of Waterborne Diseases.

Variables	YES		NO		
	Frequency	Percentage	Frequency	Percentage	Total
Awareness of WBDs	464	69.9	200	30.1	664(100%)
Able to describe WBDs	504	75.9	160	24.1	664(100%)
Ever suffer from WBDs	464	69.9	464	30.1	664(100%)
Ever suffer from WBDs by family Members.	560	84.3	104	15.6	664(100%)

Source: Field Survey, 2012.

Table 4.5 shows that 69.9% of respondents are aware of waterborne diseases, while 30.1% are not aware of the scourge. Similarly, 75.9% can describe what actually constitute waterborne diseases, while 24.1% cannot. Furthermore, 69.1% have suffered one form of waterborne disease or the other, but 30.1% never.

Finally 84.3% of respondents accepted that members of their family had sometime suffered from waterborne diseases while 15.6% had not seen the members of their household infected with a waterborne disease. The results of FGD discussions, affirmed the above assertion that, many are aware of waterborne diseases, while it is confirmed that many had at one time or the other suffered from waterborne disease. Similarly, in an in-depth interview, a community leader affirmed thus:

“Waterborne diseases have remained a major health problem for Kwarans. In mine many years as a civil servant in the state, waterborne diseases has killed more than any other diseases that I know of ”(IDI, Ogbena, Asa LGA, 2012).

Other discussants opined that, some of their household members had experienced waterborne disease at one time or the other.

On whether level of prevalence of waterborne diseases at household level, a discussant agreed that at a point, virtually every household has an infection of waterborne disease:

“ At a stage that every house had infection of one waterborne disease or the other; in my house every member of household had infection of waterborne disease”.(IDI, Ilorin-East LGA,2012).

In an interview with a key figure government official, six major waterborne diseases were identified in Kwara State. According to this source:

“These diseases are Typhoid, onchocerciasis, cholera, Schistosomiasis diarrhea and trypanosomiasis and their level of prevalence varied from one senatorial district to another.”(IDI, Idi-Agano, Moro LGA, 2012).

4.2.1 Factors Promoting Waterborne Diseases

Generally, the level of water borne diseases in any human society is dependent on a number of factors. These factors vary from one area to another, particularly interaction with environment.

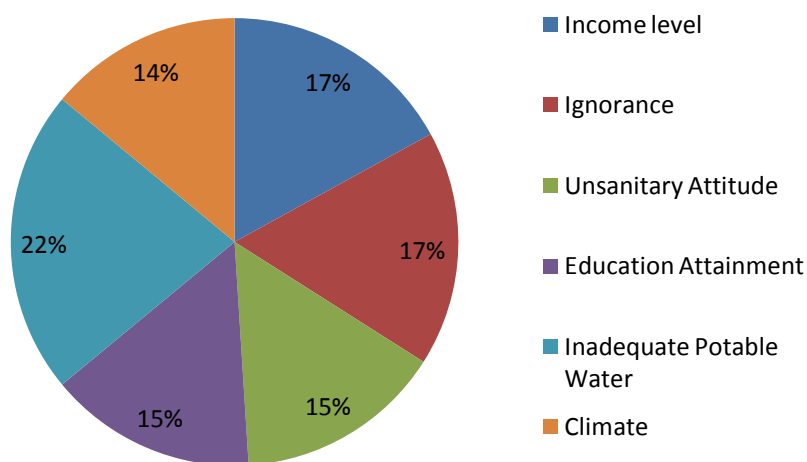


Fig.4.5: Distribution of Respondents by Factors Responsible for WBDs
Source: Field Survey, 2012.

Figure 4.5 reveals that 14.0% of respondents agreed that, climate can induce the prevalence of waterborne diseases. Studies have shown that, water related diseases often increase with change in climate (Parmentar et al, 1999).

In a submission by a participant in one of FGDs and interviews in the study area, climatic factor is identified as one of the key factors responsible for the prevalence of waterborne diseases in the study area. In the submissions, this is summarized by one of the house heads:

“ It is a common thing among the people that, as result of dearth of potable water, we struggle with livestock over the available streams/rivers as rain recede for domestics and other uses”.(IDI Falokun, Ifelodun LGA,2012).

This view was echoed by another discussant in an interview.

“Here we share our water with livestock, which had resulted in clashes with herdsmen in time past, in addition to the associated diseases that have ravaged our communities”.(IDI Oloru, Moro LGA,2012).

Available sources of water in this area are rivers and streams, which are shared with livestock. Most wells are not covered; making them unsafe for human consumption.

It is believed that the prevalence of the most common waterborne diseases in Kwara State can be associated to non-availability of potable water. Accordingly, the effect is manifested in the level of development of the area. Another discussant averred that:

‘We rely on streams to source our domestic water. Government over the years has neglected us, on borehole and we have been living in fears of waterborne diseases’.(FGD, Gate, Kaiama LGA,2012).

Furthermore, 17.0% of the respondents believe that income level affects water borne diseases. Income status determine disposable income accrue to a people. With low income, a person’s accessibility to modern health care and other essentials of life are limited, thus they are forced to live by what is available. But high income earners can afford to access some of these essentials of life and even extend same to their immediate surroundings.

A discussant observed that,

“Our income is so meager; we result to self- medication, which mostly lead to untimely death, drop out among the school children and Socio-economic disruptions”.(FGD, Bode–Saadu, Moro LGA,2012).

Figure 4.5 further show that, 15.0% respondents agreed that, unsanitary attitudes have aided the spread of water borne diseases. In the study area, like in other part of developing world, human wastes are openly deposited and most of them end up in the hydrological cycle. According to a retired nurse who was also part of FGD discussion:

“Unsanitary attitude is a key factor that is common in many part of Kwara State: waste are openly deposited as many residents do have adequate waste disposal system”.(FGD, Venra, Kaiama LGA,2012).

The above stance is corroborated by a Report of National Population Commission (2009) which shows that over 90.0% of residents of Kwara State rely on non-improved sanitation facilities.

Bearing in mind the relationship between diseases and poor sanitary attitudes, little wonder that the study are will continue to be in trouble of diseases, if sanitation is not given the attention it deserves. Similarly, 22.0% of respondents agreed that, inadequate potable water is a major determinant of the prevalence of waterborne diseases in the area. It is no gain saying that, the bane of waterborne diseases in most human society is as a result of unsafe water. Most areas in the study area lack accessibility to clean and qualitative water. A discussant asked persuasively that:

“Would the government allow us to die before coming to our rescue, as non- availability of potable water is panacea for disease society.”(FGD, Pandoro, Asa LGA, 2012).

In addition, 15.0% alluded to the factor of education as one the determinant of waterborne diseases’ prevalence in the study area. Education is a key to development and an index to measuring human development.

It follows therefore that, no matter how adequate a waterborne disease's is, without education, nothing can be achieved. Lastly 17.0% of respondents accepted that, ignorance is one of the factors promoting waterborne diseases in Kwara State. Ignorance is lack of education and in the North Central zone within which the study area falls, the literacy level among men and women stood at 75.6% and 47.6% respectively as at 2010 (NPC, 2010:35). Bearing in mind the relationship between education and health status of people, as an essential tool for information dissemination, the above scenario is worrisome, particularly as it relate to women. Generally, it is suggested that ignorance coupled with other traditionally held views about giving out information constitute a major impediment to eradication of not only waterborne diseases, but other diseases that are not water related.

A discussant concurred that:

“ We are far behind educationally, when compared with other areas and this is having serious effects on all the segment of society. Even when good programmes are introduced, interpretation is a problem because of heterogeneous and literary nature of our area” (FGD,Aiyedun, Oke-Ero LGA,2012).

Majority of the discussants averred that, not until when potable water is available, people will continue to suffer from waterborne diseases. This is similar to the view expressed by Adewusi (2012) in analyzing the National Rural Water Supply and Sanitation (NRWSS) in Nigeria.

4.2 .2 Sources of Water in the Study Area

Water is vital in socio-economic development of human society. The source of water available to a people can determine the quality of their lives. It is required for many purposes, thus its availability in quantity and quality is importance to geographers.

For one, quality water to a large extent determines the productivity of a people. A healthy people are likely to be productive more than a sick society (Moe and Rheingans, 2006). However, accessibility to potable water in the study area is a mirage. A look at Figure 4.6, gives a sorry picture of sources of water in the study area.

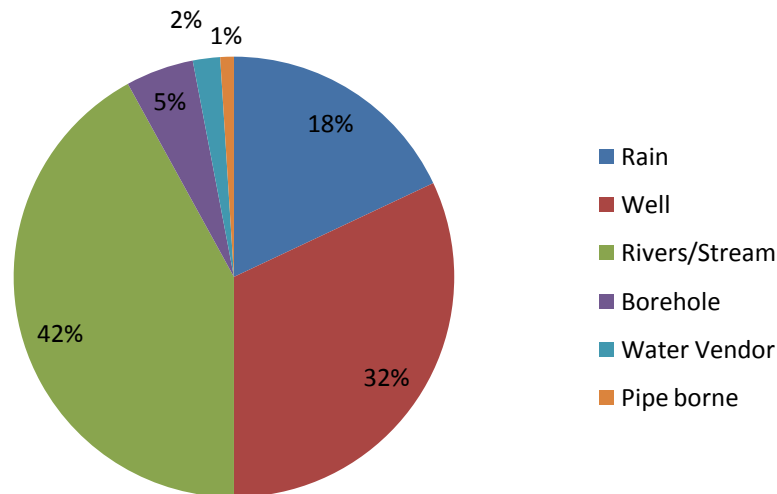


Figure 4.6: Sources of Waterborne Diseases.
Source: Field Survey, 2012.

According to the Figure 4.6, 18.0% of the respondents in the study area rely on rain water, especially during the rainy season. Similarly, 32.0% of respondents also rely on wells for their uses. Furthermore, majority of the respondents (42.0%) in area take their water from rivers/streams and 5.0% source their water from bore holes. In the same vein 1.0% and 2.0% of the respondents also sources their water from pipe borne and water vendors respectively. In interviews with some opinion leaders across the length and breadth of the study area, they submitted that, most people source their water needs from wells, rivers/stream and lately from boreholes.

“The bulk of our water uses are sourced from rivers/streams; our women wake early in morning trek few kilometers to look for water. Beside the time this practice consumes, the method of conveying water home is not hygienic” (IDI ,Idofin-Odo-Ase,Oke-EroLGA,2012).

This view was also shared by a retired nurse:

“Water situation here is pathetic, as we source for water from unprotected sources. In most cases, water from wells (a major source of water) is hard. Most rivers/streams recede with season, thus we are forced to live with unprotected water” (IDI , Elemosho, Moro LGA,2012).

In aligning with the above submissions, in an interview with another opinion leader, it was agreed that:

“We started getting relieved as a result of innovation of borehole technology and supply from water vendors. Prior to that period, we source our water from open surface water” (IDI, Lasaju, Asa LGA,2012).

In summary, the picture of water supply in the study area shows that, over 94.0% rely on unsafe sources for their water supply, while 66.0% source their water from questionable places (Figure 4.6). The implication of these may be bad not only for the study area, but for development of Nigeria. Rivers and streams are opened to pollution because they are not protected and as a result of variation in season, rain water may not be available the year round. It follows therefore that people are forced to source their water from questionable sources.

Generally, the above scenario shows a poor state of water supply in the study area, given the large of people in the study area who rely on rivers and streams for their water needs. This may be as result of general absence of pipe borne water in the area, poverty level of the people, and level of ignorance among others. Accessibility to water in the study area varies from one area to another. In the sampled parts of the state, most people source their water from Rivers/streams, rain and wells (Figure 4.6). These sources of water do not meet safe water standard, as most of them are not covered (FGN, 2000). Thus besides being prone to incidence of pollution, much time and energy is spent sourcing water through wells. In some localities particularly in urban and peri-urban parts of the study area, many rely on water vendor.

This varies from bagged half litre (packaged water) to large water tankers and truck pushing vendors that have all become important ways of sources of water supply in the study area. The sources of obtaining water by these vendors, to a large extent determine the level of waterborne diseases in the study area; as such water may be obtained from questionable sources because of the water situation in the area.

To overcome the problem of waterborne diseases in Kwara State, constraints such as corruption, poverty which has made accessibility to essentials of life such as water and health facilities difficult must be tackled. Solutions to these problems can elicit socio-economic development and its chain effects.

4.3 Surmounting Challenges of Waterborne Diseases

Having identified waterborne diseases as major health problem, the need to proffer solutions becomes germane. In all the FGDs and interviews, it was agreed that finding solutions to waterborne diseases is imperative.

“Many would agree that waterborne diseases are cog in the wheel of progress as manifested in drop out, economic deprivation among others. Therefore, containing the scourge is central to the development of human society”(IDI Alegongo-Temidire, Ifelodun LGA,2012)

In an interview with a retired teacher, who doubled as a community leader:

“I have had cause to work in various part of Kwara State, what I discovered is that, there are waterborne diseases in the state. Its prevalence may be linked to a number of factors such as ignorance and apathy on the part of people to imbibe simple personal hygiene.”(IDI ,Maso, Moro LGA,2012).

However, in containing the scourge, participatory approach should be encouraged in order to sustain development. This may take the form of enlightenment; communities now dug wells in addition to encouraging the victims of water borne diseases to visit the hospital.

A community leader suggested adequate health and hygiene education:

“Adequate health education is central to elimination of waterborne diseases. In Asa local government area, this same strategy was used; today that local government area which was the epicenter of guineaworm, is now guineaworm free.”(IDI, Oke-Ero, LGA,2012).

Accessibility to potable water both in quality and quantity, are important in wading off waterborne diseases and its associated problems. The rural areas (of the study area), still lack safe water, which does not make them totally free from water borne diseases. Having identified the adverse effects of waterborne diseases can impose on people; the discussants overwhelmingly agreed that there should be improvement in the provision of safe water. An opinion leader opined that:

“A need for provision of potable water as a major means of containing waterborne diseases is very necessary. Larger percentage of people in study area do not have access to safe water; the urban centers which seems to have concentration of water facilities still suffer from inadequacy of this essential item.”(IDI,Ologii, Ilorin-East, LGA,2012).

Another discussant, submitted:

“Effort should be made to maintain the existing water facilities in the area as a guarantee for a sustained waterborne diseases prevention programme.”(IDI, A Nurse, Erinmope, Oke-Ero LGA, 2012).

Aganaba(2006) had submitted that, most of the water facilities in Kwara State are a state of dysfunction. An opinion leader who is a retired civil servant opined that high level of poverty, which has made disposable income impossible, is a major determinant of waterborne diseases.

“In their word, government should make certain social services such as potable water, and good their priority.’ As poverty among the people not encourage participation from the populace”(IDI,Koro,Oke-Ero,2012).

4.4 EFFECTS OF WATERBORNE DISEASES IN KWARA STATE

Table 4.6: Effects of Waterborne Diseases.

Effects of waterborne diseases	Frequency	Percentage (%)
General Economic loss	140	21.1
Deaths	73	10.9
Drop out of school	50	7.5
Permanent disability	33	5.0
All of the Above	368	55.4
Total	664	100.0

Source: Field Survey, 2012.

Table 4.6 reveals that 100.0% of the respondents agreed that waterborne diseases have negative effects on socio-economic sector of the study area. Over 21.0% of respondents are of the believe that, waterborne diseases can lead to general economic loss. This has been corroborated by a FGD report, where a discussant identified loss of working hour as a major effect of waterborne diseases.

“My experience of waterborne diseases is a sad one, as time is wasted in administration of medicine. Where one is to take care of the victims, the number of hours caring for the victims often result in wastage of productive hours” (FGD ,Agunjin, Ifelodun LGA,2012).

The epidemic center of waterborne diseases have been associated with many adverse effects such as morbidity and aggravation of the existing poverty (Smith, 2010; Cebedo, 2010; Oguntoke et al, 2009)

A seasoned faith leader opined that:

“Waterborne diseases can lead to deaths among the children and adults and general economic loss as some of the effect.”

(FGD, Pandoro, Asa LGA, 2012).

Many victims result to self-medication, because they cannot afford hospital bills, where such medical facilities are available. Others also find solution in the use of herbs, all which often result in death among both the adults and children. This is similar to the findings of Oguntoke et al in the study of Ibadan city, Nigeria. It is also manifested in low education, because where these diseases occur, much money is spent at both the government and individual levels at the expense of education.

“Education also suffer from waterborne diseases, as it can lead to drop out and general retardness in the development of people.”(IDI, Ifelodun LGA,2012).

The summary of these is that, waterborne diseases has a lot negative impact on the people and only prompt attention can contain it.

4.5 SOCIO-DEMOGRAPHIC VARIABLES AND PREVALENCE OF WATERBORNE DISEASES IN KWARA STATE

The relationship between man and diseases are highly interwoven. While the prevalence of diseases in a human society determines the health status of people, how the environment is managed by man can induce their prevalence or otherwise of diseases. In this study, it has been shown that there is a relationship between waterborne diseases and wellbeing of human beings.

Table 4.7: Results of Crosstabulation between Water Borne Diseases and Sex

SEX	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
Male	108(16.2%)	105(15.8%)	104(15.7%)	105(15.8%)	91(13.7%)	87(13.1%)	600(90.4%)
Female	9(1.4%)	11(1.6%)	9(1.4%)	11(1.6%)	14(2.1%)	10(1.5%)	64(9.6%)
TOTAL	117(17.6%)	116(17.5%)	113(17.0%)	116(17.5%)	105(15.8%)	97(14.6%)	664(100.0%)

Key			
CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPONOSOMIASIS

However, in order to ensure the reliability of the above statement, data on waterborne diseases are crosstabulated with demographic variables such as sex, age, income and education as presented in Tables 4.7, 4.8, 4.9 and 4.10

From Table 4.7, the result of crosstabulation between waterborne diseases and sex, show that 90.4% of respondents are males and 9.6% are females. Indeed, 14.6% of both sexes agreed that *Onchocerciasis* is rampant, while 17.6% of respondents accepted that, cholera is a common waterborne disease in the area. However, 17.5% of the respondents are of the view that trypanosomiasis and diarrhea are two common waterborne diseases. There is variation in the prevalence and occurrence of the six waterborne diseases examined. Because of the cultural and religious factors in the study area, the information is available with men than women. Ogbuagu, Emeanya, Chukwuma, Ogbagu and Oguoma (2009) affirmed in a study of the Patients on admission in accident and emergency unit of Nnamdi Azikwe University Teaching Hospital, that there is variation in the prevalence of intestine parasitic infection between female and male

Table 4.8: Results of Crosstabulation between Water Borne Diseases and Age

AGE(YEAR)	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
20-24	0(0%)	1(0.7%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	5(0.7%)
25-29	1(0.7%)	1(0.7%)	0(0%)	0(0%)	1(0.7%)	1(0.7%)	4 (0.6%)
30-34	3(0.4%)	4(0.6%)	2(0.3%)	4(0.6%)	4(0.6%)	3(0.4%)	20(3.0%)
35-39	6(0.9%)	4(0.6%)	4(0.6%)	5(0.7%)	5(0.7%)	6(0.9%)	30(4.5%)
40-44	16(2.4%)	11(1.7%)	9(1.4%)	12(1.8%)	15(2.3%)	17(2.6%)	80(12.0%)
45-49	25(3.8%)	28(4.2%)	21(3.1)	39(5.8%)	23(3.4%)	16(2.4%)	152(22.9%)
50-54	35(5.2%)	40(6.0%)	27(4.0%)	42(6.3%)	16(2.4%)	40(6.0%)	200(30.1%)
55-59	14(2.1%)	15(2.2%)	19(2.8%)	5(0.7%)	19(2.8%)	18(2.7%)	90(13.6%)
60-64	7(1.1%)	5(0.7%)	5(0.7%)	5(0.7%)	15(2.2%)	8(1.2%)	45(6.8%)
60and above	8(1.2%)	6(0.9%)	3(0.4%)	3(0.4%)	8(1.2%)	10(1.5%)	38(5.7%)
TOTAL	115(17.3%)	115(17.3%)	91(13.7%)	116(17.4%)	107(16.1%)	120(18.0%)	664(100.0%)

Key

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

Furthermore Table 4.8 shows that, the respondents in the age range of 25-29year constituted the least of 0.6% and they agreed that waterborne diseases are common in the study area. This is closely followed by respondents in the age between 22 and 24years, with 0.7% who also affirmed that waterborne diseases are in existence in the study area. Lastly, 30.1% of respondents of 30-34years age group accepted that waterborne diseases are prominent in the area. Age is one of the indicators of socio-economic status of a people. The most active age group in the study constitute about 94.3%.The are directly involved with collection of water, so they are directly affected water related diseases.

This similar to the findings of Gao, Kathleen and Hui (1998) who posited that, certain diseases are associated with age

Table 4.9: Results of Crosstabulation between Water Borne Diseases and Income

INCOME (₦)	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
> 5000	64(9.6%)	59(8.8%)	57(8.5%)	66(9.9%)	67(10.0%)	65(9.7%)	378(56.9%)
5000-10000	18(2.7%)	23(3.4%)	26(3.9%)	23(3.4%)	21(3.1%)	22(2.3%)	133(20.0 %)
11000-16000	11(1.6%)	9(1.3%)	14(2.1%)	12(1.8%)	10(1.5%)	12(1.8%)	68(10.2%)
17000-22000	11(1.6%)	12(1.8%)	6(0.9%)	6(0.9%)	6(0.9%)	11(1.6%)	52(7.8%)
2300 and above	4(0.6%)	5(0.7%)	7(1.1%)	6(0.9%)	6(0.9%)	5(0.7%)	33(4.9%)
TOTAL	108(16.2%)	108(16.2%)	110(16.6%)	113(17.0%)	110(16.6%)	115(17.3%)	664(100. %)

Key

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

In Table 4.9, majority (56.9%) of respondents whose income are less than ₦5000, have had contact with waterborne diseases, while 20.0% of the respondents earn between ₦5,000- ₦10,000. The respondents whose income is between ₦23,000 and above, constitute 0.6% agreed that waterborne diseases are common health problem in the study area. This implies that, income is one of the key determinants to accessibility to safe water; thus the link between waterborne diseases and income. Roderick (2009)opined that poverty by extension income is a major contributing factor to the prevalence of waterborne diseases in Nigeria.

Table 4.10: Results of Crosstabulation between Water Borne Diseases and Education Attainment

EDUCATION	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
Non-Formal/Adult Edu	30(4.5%)	31(4.6%)	30(4.5%)	23(3.4%)	40(6.0%)	26(3.9%)	180(27.1%)
Islamic	9(1.3%)	9(1.3%)	5(0.7%)	4(0.6%)	8(1.2%)	5(0.7%)	40(6.0%)
Primary	5(0.7%)	4(0.6%)	5(0.7%)	6(0.9%)	3(0.4%)	4(0.6%)	27(4.0%)
Secondary	15(2.3%)	10(1.5%)	10(1.5%)	20(3.0%)	30(4.5%)	21(3.1%)	106(16.0%)
Tertiary	14(2.1%)	15(2.2%)	13(1.9%)	15(2.2%)	19(2.8%)	17(2.5%)	93(14.0%)
No educational background	20(3.0%)	28(4.2%)	39(5.7%)	30(4.5%)	40(6.0%)	61(9.1%)	218(32.8%)
TOTAL	93(14.0%)	97(14.6%)	102(15.4 %)	98(14.7%)	140(21.0%)	134(20.2%)	664(100)

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

Available data in Table 4.10, the results reveal that, 27.1% of respondents with non- formal /adult education agreed that there are waterborne diseases in the study area. Conversely, 40.0% of respondents whose educational attainment ranges from Islamic, primary, secondary and tertiary believe that waterborne diseases are common, while 32.8% of the respondents who did not have formal education were of the view that waterborne diseases are health problems in Kwara State. Looking at the relationship between education is one of the determinants of job placement, which also determine the income; which may translate to accessibility to essentials of life including safe water, the educational scenario worries minds. In a study of Ile-Ife, Olujuyigbe, Adegboyega and Salubi (2012) identified the factor of enlightenment is a panacea for waterborne eradication in Nigera.

Central to these submissions and without prejudice to the geographical location, demographic variables remains a major index of measuring the prevalence of waterborne diseases.

4.6 SEASONALITY OF WATERBORNE DISEASES IN KWARA STATE

Many studies have shown that, there is a strong relationship between climate and prevalence of diseases. In one of the information posted on line by Doctors without borders (2012), there is noticed increase in prevalence of malaria in winter than other seasons in their observation of Kenya. The study area has two seasons-rainy and dry seasons, with short brake of rain between late july and early august.

Table 4.11: Seasonality of Waterborne Diseases.

Season	Frequency	Percentage (%)
Rainy	470	70.7
Dry	150	22.6
August Break	44	6.6
Total	664	100

Source: Field Survey, 2012.

A look at Table 4.11 reveals that, 70.7% of respondents agreed that waterborne diseases are common phenomena in the rainy season than other seasons. They link this trend to the fact that, during rainy season people interacts with water (safe and unsafe) than during the dry season. Furthermore 22.6% believed that, waterborne diseases are prevalent in the dry season. According to these respondents, dry season is a period when water is scarce in the study area, such that livestock compete human being over the few available sources of water. While 6.6% agreed that waterborne diseases rears their head mostly in the period rain recede between late july and early august, which we refer to as august break. However, a discussant during one of FGDs, a nurse who has traversed nooks and crannies of the study area averred that:

“My experience in the study area reveals that, waterborne diseases are common during the rainy season. It is a period that when people resort to questionable water for their domestic uses”.(FGD Gate, Kalama LGA, 2012)

This assertion has been corroborated by Aganaba (2005) in a GIS survey of water report of Kwara State.

From the above, there is more of prevalence and occurrence of waterborne diseases in the dry season than in the wet season. Dry season is a period when all the available from sources dry up, thus the few available water sources are shared with livestock. This according to Cairncross et al (2002) assists in the transmission of waterborne diseases, and

this may be advanced as one of the reasons for the prevalence of waterborne diseases in the study area.

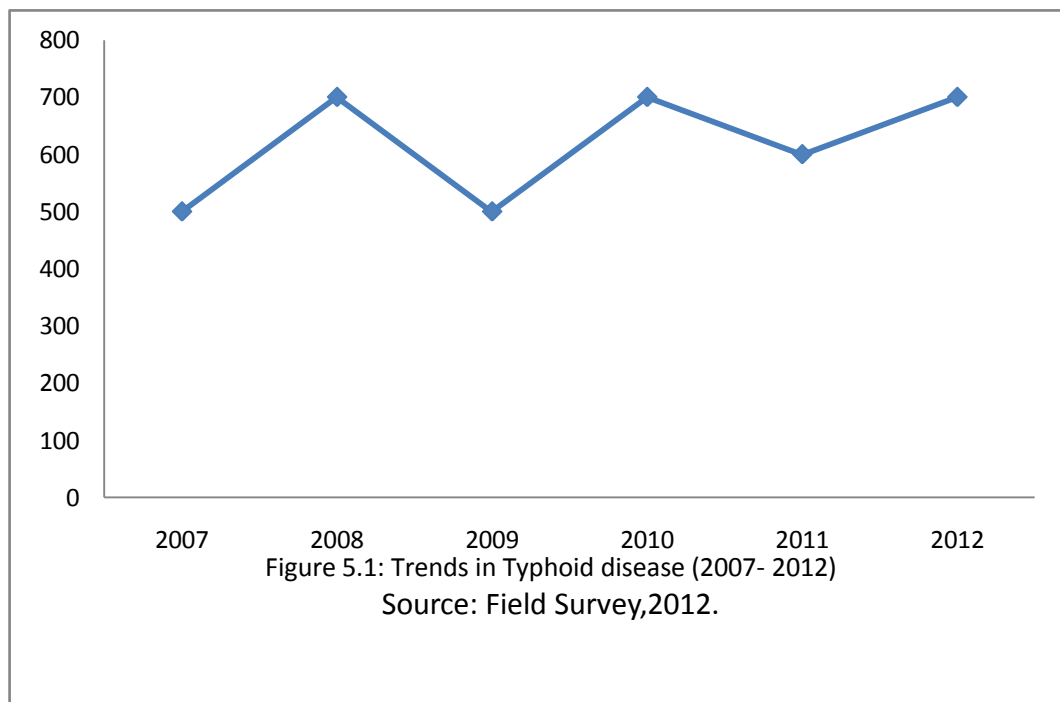
CHAPTER FIVE

SPATIO-TEMPORAL TRENDIN WATERBORNE DISEASES IN KWARA STATE.

5.1 Introduction.

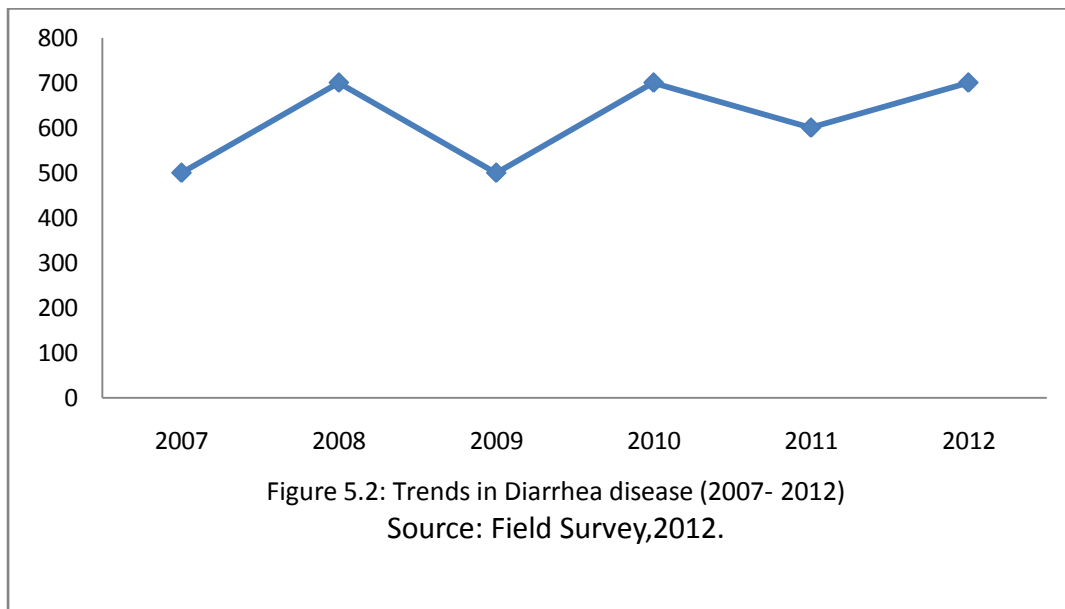
Generally, there is variation in availability of potable water the world all over. While the advanced countries of the world enjoys uninterrupted safe water supply, the same cannot be said of the developing countries. This may be partly due to the apathy on the part of government to make available potable water and low economic background of the people. Sanitation which is another indicator of socio-economic and health status is nothing to write home about. The ratio of people that have access to safe water falls short of universal standard, which has resulted in high mortality and untimely deaths among the adults. According to Kwara State Ministry of Health (2012), the state recorded a number of cases of waterborne diseases and is as analyzed. This submission has been corroborated by the field findings.

5.2 Trend in Typhoid Disease (2007-2012)



A look at Figure 5.1 affirmed that in the period 2007-2012, typhoid disease in the State became more prominent than previous years. The state recorded the highest cases of typhoid in 2007, while the lowest cases were recorded in 2009. This trend is linked to inaccessibility to improved sanitation and improper hygiene. Many in the study area do not have access improved to adequate sanitary system; indeed wastes which end in the water system are openly deposited. This may be responsible for the prevalence and occurrence of this scourge in the area under study.

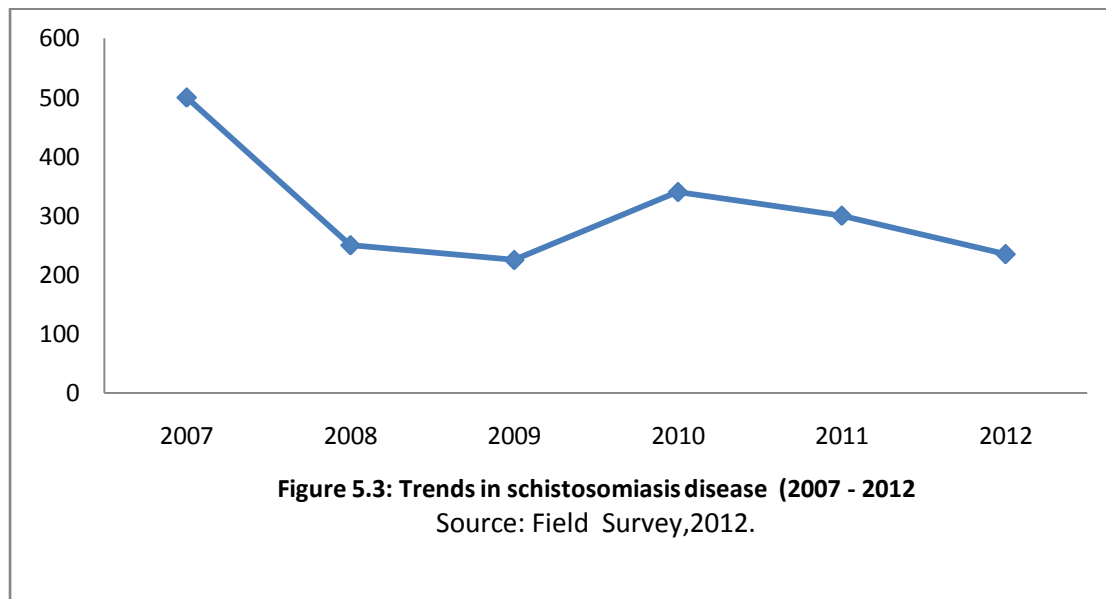
5.3 Trend in Diarrhea Disease (2007-2012)



A look at Table 5.2 also affirmed that diarrhea is another major disease in the state; between 2007-2012 there were 3,100 recorded cases of diarrhea. A breakdown of these cases showed that the state had highest recorded cases of diarrhea in 2008, 2010 and 2012 with 700cases respectively. However, 2009 recorded the lowest cases of the disease in the state. Diarrhea is one of the causes of death in Nigeria; this has been associated to poor personal hygiene and consumption of unsafe water. Potable water situation in Nigeria is highly appalling, such that people result to questionable sources of water.

Achieving MDG of getting water to half the population may not be met, and this may jeopardise all the efforts geared towards eradication of diarrhea disease in the study area and may be responsible for the trend of the disease.

5.4 Trend in Schistosomiasis Disease (2007-2012)



Similarly, Figure 5.3 showed that the state had reported cases of *Schistosomiasis* of 1,850, out of which the state recorded highest figure of 500 was recorded in 2007. The year 2009 recorded the lowest recorded cases of the disease. Cases of Schistosomiasis are associated to unsafe water, which is associated to the study area. Majority still source their water need from unprotected wells and rivers/streams. The trend in the prevalence and occurrence of Schistosomiasis are likely informed by dearth of safe water. The burden of Schistosomiasis as manifested in poverty of endemic communities has attracted both the international community and Federal Government of Nigeria. The Carter Center has assisted the Federal Government of Nigeria through National Schistosomiasis Control Initiatives of Nigeria.

5.5 Trend in Onchocerciasis Disease (2007-2012)

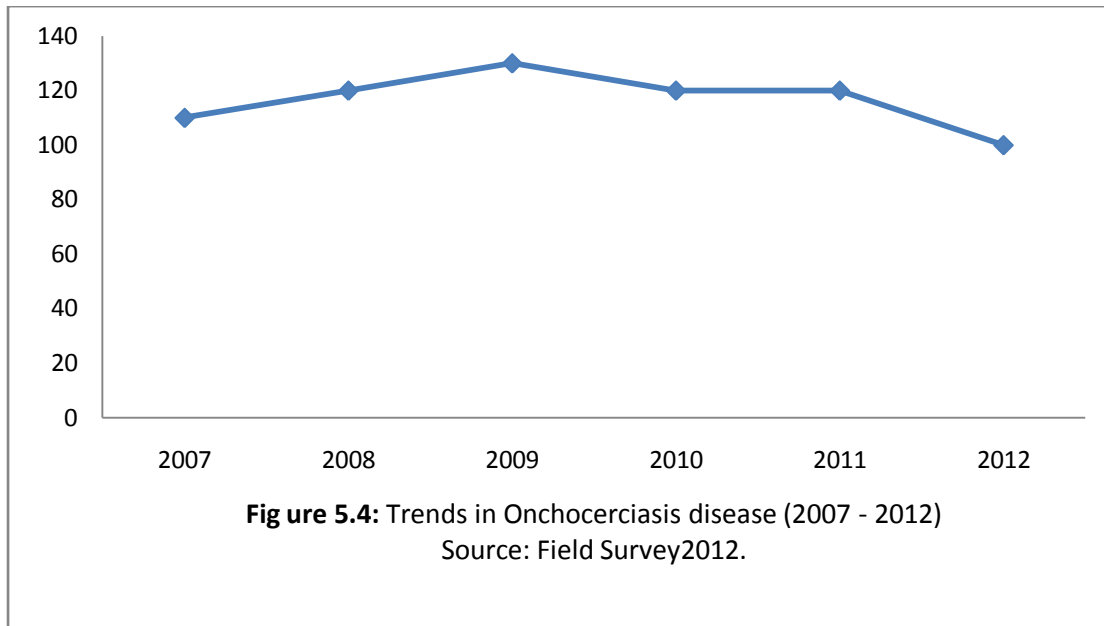
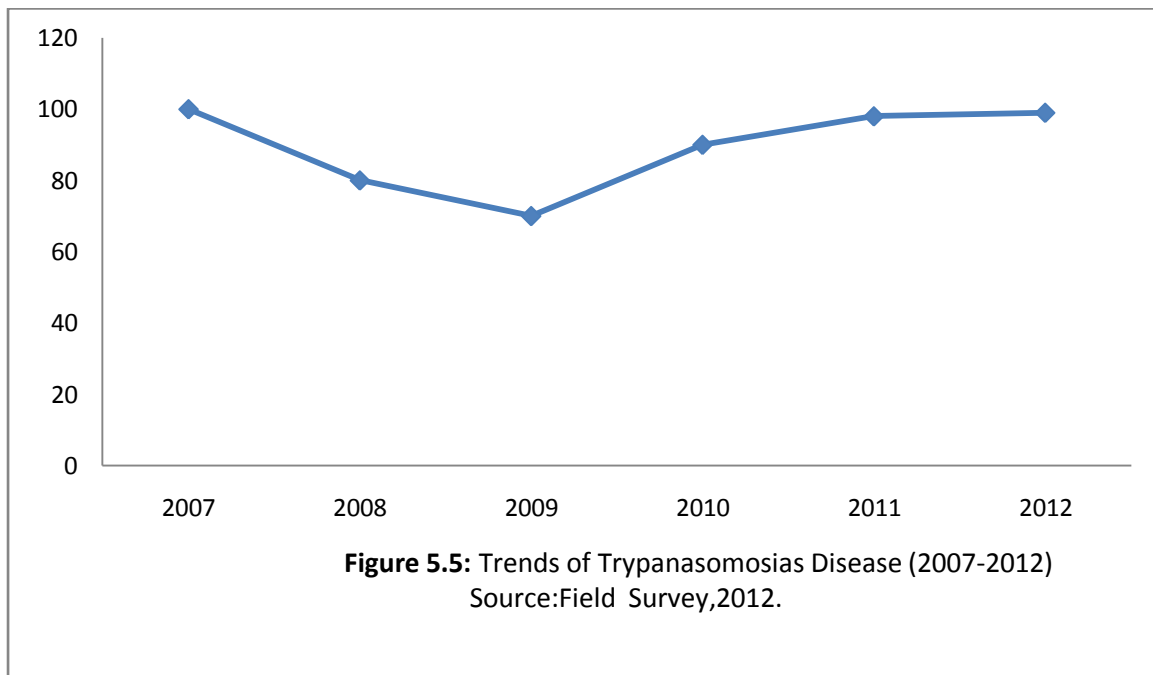


Figure 5.4 also showed that *Onchocerciasis* was prevalent in the state in the period under study with 650 cases. The highest number of reported cases was in 2008, 2009 and 2010, while in 2012, the state recorded lowest cases of 110. This trend may be associated to the fact; *Onchocerciasis* has been identified as a major public health problem. Poor and unsafe water are the major causes of prevalence and occurrence of *Onchocerciasis*. This has also led to the establishment of National Onchocerciasis Control Programme. The eradication strategy involved the large scale treatment of endemic communities with *ivermectin* drug, which is expected to be administered in the endemic communities periodically. The eradication programme relied heavily on health education towards community mobilization, health education on the knowledge of the scourge, attitude and practice of endemic communities.

5.6 Trend in Trypanosomiasis Disease (2007-2012)



A cursory look at Figure 5.5 showed that the graphic feature of the scourge of trypanosomiasis. The state had the highest reported cases in 2007, while in 2009 the level of cases slump to 70. The trend may be as a result of interest showed by Federal Government of Nigeria in establishing the Institute of Trypanosomiasis Research (ITR).The institute with the evolvment of massive health education was able to reduce the level of prevalence of the disease. However, it is observed that the disease also rose in 2012 .This too may be as a result of inadequacy in availability of potable water.

5.7 Trend in Cholera Disease (2007-2012)

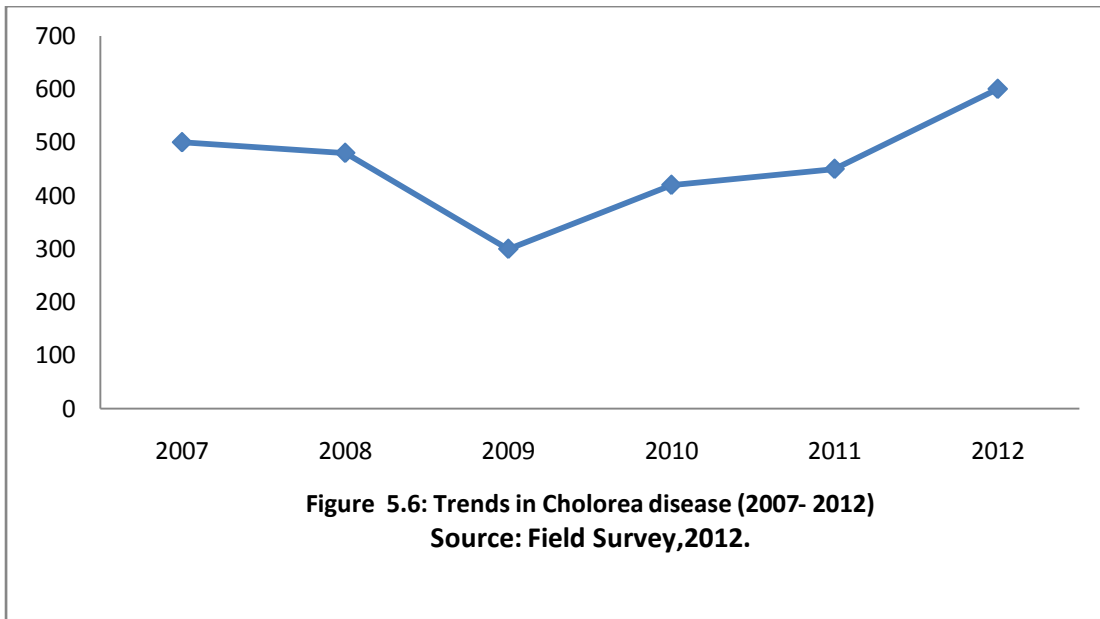


Figure 5.6 also revealed that, in the period under study, the state recorded 2,750 cases of cholera, with the highest cases in 2012. The disease went down further in 2009 with 300 cases, while there was an upsurge in the prevalence of this disease in 2010 with 420 cases. Nigeria has the history of resurgence of cholera outbreaks, and this trend may be linked to the growth in population, without corresponding increase in water infrastructure, significant breaches in water and sanitation. This may have informed the multi-sectoral approaches in the eradication drive by the Federal Government of Nigeria including Epidemic Preparedness and Response (EPR).

In summary, the noticed trend in the prevalence and occurrence of water borne diseases in the study area are attributable to a number of factors, which include population growth without growth, ignorance, and inadequate potable water among others. In one of the FGDs, a health care provider who has traversed all the senatorial districts of Kwara State averred that:

“ From my experience, there is variation in the existence of waterborne diseases in the state; this may be attributed to the level of availability of potable water in the districts. Whereas the level of occurrence and prevalence is low in the Kwara Central senatorial district, it is opposite in the other senatorial districts of North and South ”.(FGD ,Ilorin East LGA, 2012).

The above picture of the major waterborne diseases in Kwara State, worries mind, particularly because of the adverse effects these have on the pace of development of the study area. The number of cases of waterborne diseases in Kwara State, like other developing countries is a matter of estimates. This is due to the sketchy nature of our data collection; many people do not attach importance to it. Many cases went unreported because the medical facilities are not adequate, thus most records are incoherent (Ajala et al, 2005). In any human society, Craun et al (1970) and Fox (1970) identify three factors that interact to produce a disease situation, and these are:-disease agent, the host and the environment, which they christened “the web of causation.” The continuous well-being of man depends on his environment. While some environmental conditions favour the growth and dispersal of diseases, some may hamper it. An example that comes to mind is construction of dams which could serve the purpose of irrigation and also stem the problem of water scarcity.

But on the other hand, dam construction can create a conducive environment for mosquito breeding, and also increase the risk of waterborne diseases (Babatimehin, 2005).

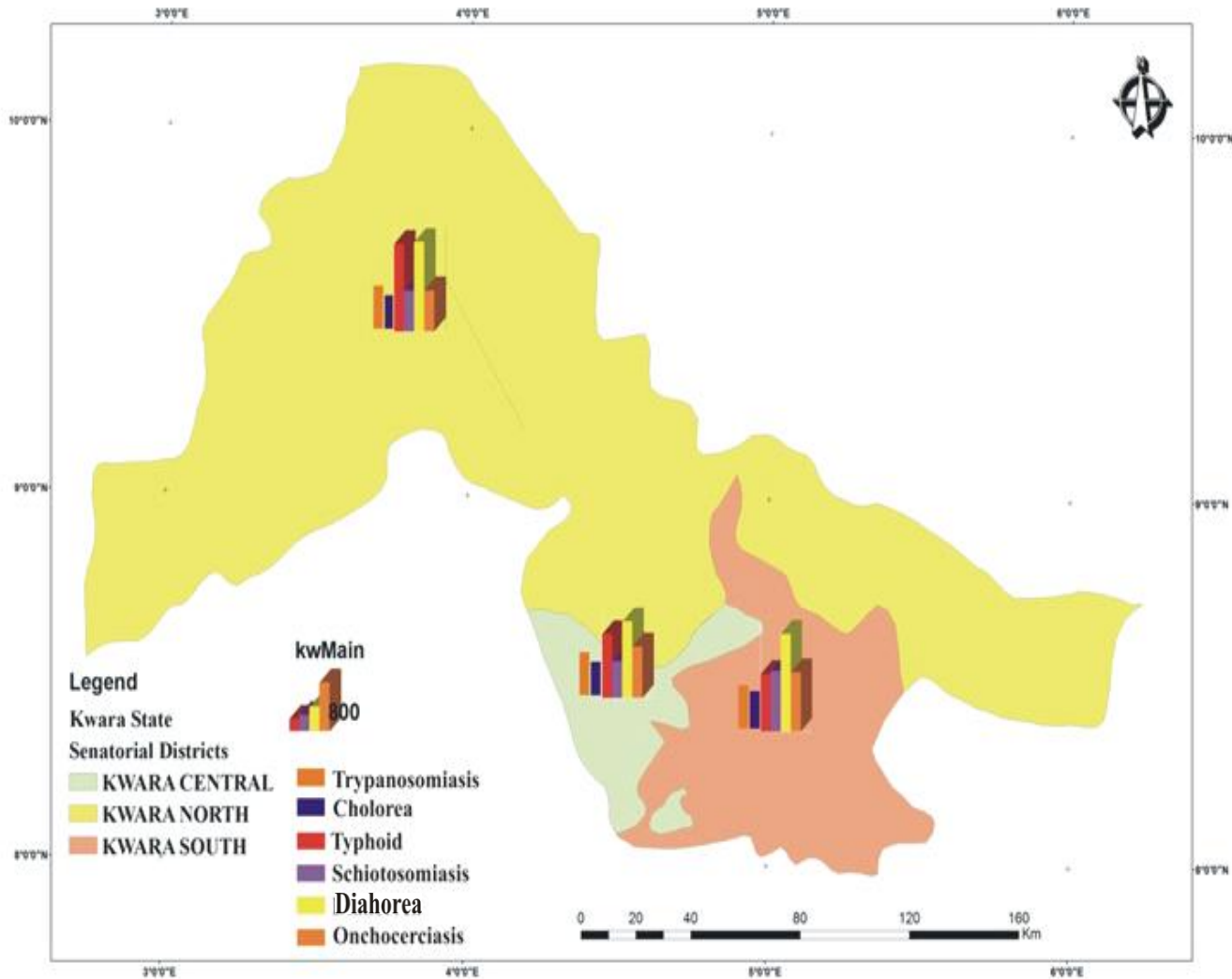


Figure 5.7: Distribution of Waterborne Diseases in Kwara State (2007-2012).pp

Source: Field Survey, 2012.p

Figure 5.7 depicts spatial pattern of waterborne diseases in Kwara State for the period under study. Six major waterborne diseases are identified in the area, with diarrhoea having the highest prevalence and this closely followed by typhoid.

The number of cases of waterborne diseases in Kwara State, like other developing countries is a matter of estimates. This is due to the sketchy of data; many people do not attach importance to it. Infact, many cases went unreported, because the medical facilities are not adequate, thus most medical records are incoherent (Ajala et al, 2005).

Potable water in the study area has not met urban and national water coverage needs as 64.4% of the populations have access to improved sources of water (NPC, 2010). However, the figure is difficult to accept considering the water crisis on ground in the state. Apart from the available records in the hospitals, the reality on ground also reveals that there is apathy of people towards visit to the hospital in the state. In the submission of one the health providers in an FGD:

“People here have not imbibed the attitude of coming to the hospital for treatment, because they often claim they cannot buy the prescribed drugs” (FGD, A Nurse , Moro LGA ,2012).

In an interview, an Islamic scholar posited, most people results to self-medication in treating their infections with its attendant effects. A farmer submitted,

“That in the face of infection and low disposable income, we are forced to result to use of herd. This had often resulted to untimely deaths among the adult and youth.” (FGD, Gate, 2012).

5.8 HYPOTHESES TESTING

5.8.1: Hypothesis I

H₀ I: there is no significant difference in the mean perception of water borne diseases across the demographic variables.

Table 5.1: t-test result of Water Borne Diseases and Sex.

<i>Demographic Information</i>	<i>Variables</i>	Mean	S.D	t _{cal}	d.f	F _{critical}	P- value	DECISION
Sex	Male							
	Female	1.8125	0.597	3.673	1328	1.96	0.0341	Rejected

Interpretation of the result:

The t – test result which seek to find out if there is a significant difference in the perception on water borne diseases based on sex (male and female) respondents.

The $t_{cal} = 3.6732 > t_{0.05, \infty} = 1.96$ and $0.0341 < 0.05$, the null hypothesis H_0 is therefore being rejected. In the Table 14, it was concluded that there is a significant difference in the mean perception of water borne diseases based on sex on the six waterborne diseases examined in this study.

Table 5.2: ANOVA result of Water Borne Diseases and Demographic Variables.

<i>Demographic Information</i>	<i>Variables</i>	Mean	S.D	F_{cal}	d.f	$F_{critical}$	P- value	DECISION
Age	25 – 34 years	2.8875	0.076	4.765	4,659	2.6189	0.0356	Rejected
	35 – 44 years							
	45 – 54 years							
	55 – 64 years							
	Above 65 years							
Income	Less than N5,000	3.793	0.022	10.86	4, 659	2.6189	0.0011	Rejected
	N5,000 – N10,000							
	N11,000 – N16,000							
	N17,000 – N22,000							
	Above N23,000							
Educational qualification	Non-formal Education	3.9321	0.143	7.211	5, 659	2.6189	0.004	Rejected
	Islamic Education							
	Primary Education							
	Secondary Education							
	Tertiary Education							
No educational background								

Reject H_0 if $t_{cal} > t_{critical}$, if $f_{cal} > f_{critical}$ or if $p - value < 0.05$

The ANOVA result on Table 5.2 further seek to find out if there is a significant difference in the perception on water borne diseases among the age group; the $f_{cal} = 4.765 > f_{0.05, (3, 559)} = 2.62$ and $0.0356 < 0.05$, the null hypothesis H_0 is therefore being rejected. Furthermore, there is a significant difference in the perception on water borne diseases at income level of

the respondents; the $f_{cal} = 10.86 > f_{0.05,(3,559)} = 2.6187$ and $0.0011 < 0.05$, the null hypothesis H_0 is therefore rejected.

Lastly, Table 5.2, seek to find out if there is a significant difference in the perception on water borne diseases among the respondents educational qualification; the $f_{cal} = 7.211 > f_{0.05,(3,559)} = 2.6187$ and $0.0000 < 0.05$, the null hypothesis H_0 is therefore being rejected. In conclusion, base on the result on Table 5.2, the null hypothesis is rejected in favour of the Alternative hypothesis. Therefore, the decision taken here is; there is a significant difference between water borne diseases and demographic variables.

5.8.2: Hypothesis II

H₀ II: There is no significant difference in the perception on prevalence of water borne diseases across the three senatorial districts of the study area.

Table 5.3: Descriptive Statistics of the Perception on the Prevalence of the Six Waterborne Diseases across the Three Senatorial Districts of the Study Area

Senatorial district	N	Minimum	Maximum	Mean	Std. Deviation
Kwara North	18	60.00	400.00	175.75	90.09572
Kwara Central	18	60.00	260.00	155.58	59.12692
Kwara South	18	60.00	450.00	186.17	89.16066

Table 5.3 shows that there is a significant difference in the perception on the prevalence of the six water borne diseases across the kwara state senatorial districts. The mean of Kwara North Senatorial district is 175.75 and standard deviation at 90.09, covering the five years under study. The implication of this is that, for Kwara North there is no significant difference in the six waterborne diseases examined. Similarly Kwara Central Senatorial district, there is a significant difference in the six waterborne diseases with mean value at 1.558 and standard deviation at 59.12692. Lastly, in Kwara South senatorial district, there is no significant difference in the rate of prevalence of six diseases, as the mean stands at 1.861 and standard deviation is 89.160.

The conclusion reached here is that, there is no difference in prevalence rate of waterborne diseases in the three senatorial districts.

Table 5.4 : ANOVA Result of the Perception on the Prevalence of the Six Diseases across the Three Senatorial Districts of the Study Area

<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	62.1471	2	31.07355	19.9561	0.000	2.22634
Within Groups	1029.239	661	1.557095			
Total	1091.387	663				

Remark: $F_{cal} = 19.9$ and $f_{0.05, 2, 661} = 2.22$, since $f_{cal} > f_{0.05, 2, 661}$ and $p - value = 0.00 < 0.05$, the null hypothesis is rejected.

Interpretation of result

In Table 5.4, the ANOVA result indicates that there is a significant different in the respondents' perception of the prevalence of the six water borne diseases across the three senatorial districts in kwara state since ($f_{cal} = 19.96$, $f_{0.05, 2, 663} = 2.22$ and $p - value = 0.00 < 0.05$). This decision was taken due to the fact that the calculate F of 19.96 was greater than the critical F value of 2.22 at 0.05 level of significant with (2, 663) degree of freedom and for p – value of 0.00 less than 0.05. The decision reached here is that, the null hypothesis which states “there is no significant difference in the perception on water borne diseases across the three senatorial district of kwara state” is being rejected in favour of the alternative hypothesis. Therefore, the conclusion reached here is; there is a significant difference in the perception on the prevalence of the six water borne diseases across the kwara state senatorial districts.

5.8.3: Hypothesis III

H₀ III: There is no significant relationship in the prevalence and occurrence of water borne diseases in the senatorial districts of the study area.

Table 5.5: The Result of Correlation Analysis on Prevalence and Occurrence of Waterborne Diseases in Kwara North senatorial District.

		Prevalence and occurrence of WBDS
Kwara North	Pearson Correlation	.530**
	Sig. (2-tailed)	.008
	Df	22

** . Correlation is significant at the 0.01 level (2-tailed).

The correlation co-efficient on Table 5.5 revealed that there is an average relationship between Kwara North Senatorial district in the prevalence of WBDs. This is because the p-value of $.008 < 0.05$ level of significance at a correlation level of 0.530 at 22 df. The null hypothesis which states that, “there is no significant relationship in the occurrence and prevalence of water borne diseases in the senatorial districts of the study area” is being rejected.

Table 5.6: The Result of Correlation Analysis on Prevalence and occurrence of WBDs in Kwara Central senatorial District.

Kwara Central	Pearson Correlation	.199
	Sig. (2-tailed)	.352
	Df	22

The correlation co-efficient on Table 5.6 revealed that there is a weak relationship at Kwara Central Senatorial district in the prevalence of WBDs. This because the p-value of $.352 > 0.05$ level of significance at a correlation level of 0.199 at 22 df. The null hypothesis that states that, “there is no relationship in the prevalence of water borne diseases in the senatorial districts of the study area” is being accepted.

Table 5.7: The Result of Correlation Analysis on Prevalence and Occurrence in Kwara South Senatorial District.

Kwara South	Pearson Correlation	.275
	Sig. (2-tailed)	.194
	N	24

The correlation co-efficient on Table 5.7 revealed that there is a weak relationship between Kwara South Senatorial district in the prevalence of WBDs. This because the p-value of .194 > 0.05 level of significance at a correlation level of 0.275 at 22 df.

The null hypothesis that states that, “there is no relationship in the prevalence of water borne diseases in the senatorial districts of the study area” is being accepted.

This suggests that the prevalence of water borne diseases is more pronounced in Kwara North senatorial district than the other two senatorial districts of Kwara Central and South senatorial districts. This scenario may be associated with the fact, Kwara South Senatorial district is known for their self help projects in the provision of social amenities. Similarly, Kwara Central senatorial district which houses the state government has the concentration of water facilities than other two senatorial districts.

5.9: Distribution of Out Patients of Waterborne Diseases in Kwara State (2007- 2012)

Central to the above submissions is that waterborne diseases are major health issue in the study area. Their prevalence varied from one LGA to another as reflected in the number of recorded out patients in the various hospitals in the study area shown in Figure 5.8. Ilorin-East Local Government Area top in the list of out-patients of waterborne diseases in Kwara State with 19.5% of respondents.

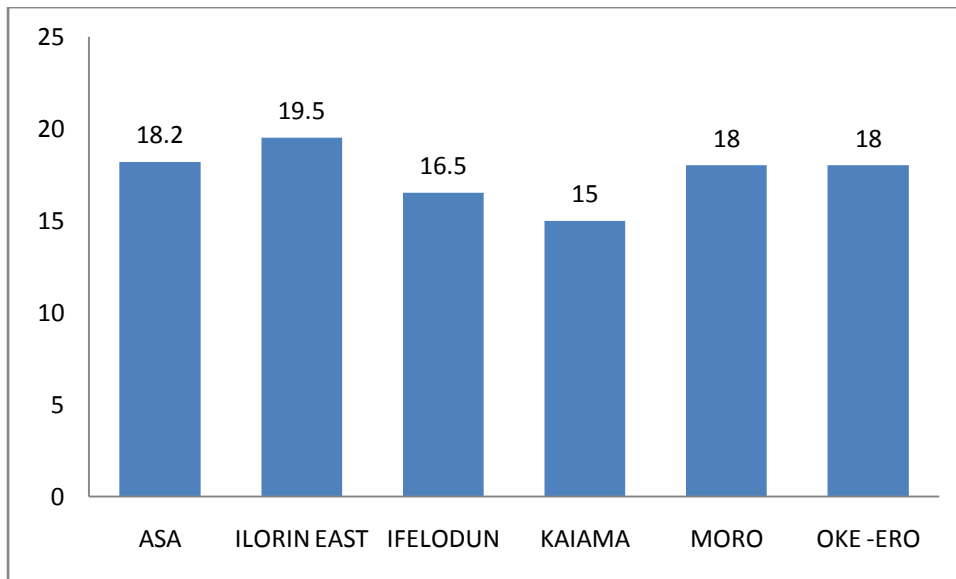


Figure 5.8: Distribution of Out Patients of Waterborne Diseases in Kwara State

It is closely followed by Asa with 18.2%, while Moro and Oke-Ero Local Government Areas follows with 18.0% each. Kaiama and Ifelodun Local Government Areas recorded 15.0% and 16.5% respectively. The implication of this is that, much time and energies which may have been spent on productive sector are spent looking for solutions to infections arising from these diseases. Aside, the reported cases, there are many unreported cases of waterborne in study area. The unreported cases may be as result of apathy on the part of people towards modern Medicare, poverty, or absence of well equipped hospital. Generally, there is variation in availability of potable water the world all over. While the advanced countries of the world enjoys uninterrupted safe water supply, the same cannot be said of the developing countries. This may be partly due to the apathy on the part of government to make available potable water and low economic background of the people. Sanitation which is another indicator of socio-economic and health status is nothing to write home about. The ratio of people that has access to safe water falls short of universal standard, which has resulted in high mortality and untimely deaths among the adults.

CHAPTER SIX

6.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS.

INTRODUCTION

This chapter examines the entire work and is presented under the major headings of summary, conclusion and recommendations.

6.2. SUMMARY

This study has established that waterborne diseases is a major health issue, because of their attendant problems, most of which are manifested in socio-economic depreciation of the study area. Typhoid, schistosomiasis, cholera, onchocerciasis, trypanosomiasis and diarrhea are the major waterborne diseases in Kwara State.

The study has shown that waterborne diseases are public health problems in the study area. This has been attributed potable water situation in the study area which is highly appalling as most people source their water from questionable sources. About 42.0% of respondents in the study area source their water from rivers/streams, which is often shared with livestock. This further portend a more dangerous situation for the inhabitants of this area, as other diseases aside waterborne diseases can find a haven place to thrive. The disadvantage of sourcing water from streams are many, because they are not covered, thus they are opened to competition with herdsmen.

It follows therefore that, the spread of the diseases through these people is further aided. Furthermore, 17.0% of respondents believe that ignorance can cause and assist in the spread of waterborne diseases. The implication of ignorance of waterborne disease is that people will continue to carry on their normal ways of live without taking steps to prevent the continuous occurrence of the diseases.

Thus, if waterborne diseases are to be eliminated, provision of potable water is a necessity. In the same, 14.0% of respondents attribute of factor of climate as one of reasons for the spread of waterborne diseases, as this singular factor can spread or reduce the rate of infection of these diseases. Although, climate is a natural phenomenon, but government can evolve programmers to harness potentials of the climate through damming amongst others. The effects of waterborne diseases cannot be overemphasized.

It can lead to deaths as evidenced in Nigeria recently when cholera outbreak killed many people in many states. This is similar to many developing countries of the world. The case is even worrisome in children where, a death of a child is reported in every minute. Similarly, waterborne diseases can cause great economic loss, as a result of disability that may ensue which may in turn lead to disruptions in trade and travel.

6.3 CONCLUSION

The study covers Kwara state and on the whole 353 households were involved in the study. Waterborne diseases are common phenomenon and have no boundary between the socio-demographic variables such as sex, age, income and educational qualification. The study has equally shown that, in terms of prevalence and occurrence in the Senatorial districts of Kwara State, there is a significant difference in waterborne diseases.

Thus, waterborne diseases are more pronounced in Kwara North senatorial district than the other two senatorial districts of Kwara Central and South senatorial districts. This scenario may be associated with the fact, Kwara South Senatorial district is known for their self help projects in the provision of social amenities. Similarly, Kwara Central senatorial district which houses the state government has the concentration of water facilities than other two senatorial districts.

The implication of this is that current state of disease in the area may become pandemic, if provision of potable water and adequate sanitary facilities are not given serious attention. As earlier noted in this study, there is a link between unsafe water and poor sanitation and waterborne diseases. Available water in the study is not adequate, and the few that are available are dysfunctional.

Closely related to this, are the challenges associated with waterborne diseases in the study area. For instance, socio-economic backwardness of the study area is an open secret, because most of the able hands have also been killed or incapacitated as result of the diseases. These are manifested in their inaccessibility to those things that can ward off water related diseases.

6.4 RECOMMENDATIONS.

It has been observed in this study that waterborne diseases will always available wherever there is dearth of safe water. That potable water and safe sanitary disposal system are panacea for waterborne diseases is not a farce, as its availability can mar or make any human settlement. The hard hit areas are Kwara north and central senatorial districts. This may not be far fetch; because self- help approach is a common practice in Kwara south senatorial district than the two other districts. In the light of this, the followings are recommended

6.4.1 Prioritization of Potable Water.

.Provision of potable water should be prioritized at all tiers of government, through the creation water and sanitation department. The situation as it is currently can be likened to a paper tiger, as its operation is tied to many political caprices. A similar counterpart funding as being practiced in education should be replicated in provision of water at Local

Government, State and Federal levels. This should not stop there; adequate utilization of such fund should be encouraged.

6.4.2 Efficient Socio-Economic Programmes and Adequate Health Education.

It is imperative that socio-economic programmes are pursued along education, in order to consolidate the gains that may accrue from self-help projects. If this is not done, there is tendency that the duo may not achieve the set objectives. When relevant socio-economic programmes are introduced, disposable income will surge up, from where self-help projects can be used as a tool for development in the absence of government intervention. The available data, does not give true picture of the reality on ground, and larger percentage of the few available water and sanitation facilities are in the state of dysfunction. This implies that, without improvement in the availability of safe water, the state may continue to be at caprice of waterborne diseases.

6.4.3 Environmental Approach as a Panacea for Waterborne Diseases.

Conscious efforts should be made by all Nigerians to keep their environment clean. This may be achieved through digging of pit latrines and safeguarding of the existing water supply facilities. People should be educated on the negative implications of polluting the available rivers and streams, as they serve as sources of potable in the state. As much as possible, our rivers and streams should be harnessed for water supply, as potable water is panacea against waterborne diseases.

6.4.4 Early Tracking of Diseases.

The use of modern technology to track diseases should be encouraged. The approach has the advantage of enabling the stakeholders in the health sector to share information on a minute on not only waterborne diseases, but other diseases' outbreak.

Tracking can assist in collecting, managing, analyzing, interpreting all water related diseases. This is achievable through collaborative efforts between the Local, State and Federal Government of Nigeria.

6.5 IMPLICATIONS OF THIS STUDY.

Many studies that have been carried out on Kwara state have their relevance. The present study is also unique with its importance and these include the following:-

1. There is wrong assumption that waterborne diseases are confined to a particular area. However, there is hardly any settlement without reported cases of the waterborne diseases with their attendant problems. The present study has revealed that, even in the remote part of world, particularly where potable water is not available, there will always be tendency for occurrence and prevalence of waterborne diseases.
2. Additionally, there is no need for discriminatory health policies between rural and urban areas. The current policy where potable water is available in urban areas at the expense of the rural may portend a serious health problem not only for Kwara State, but for Nigeria. With this study the Kwara State and indeed any other government in Nigeria will be aware that waterborne diseases are everywhere. Thus, this kind of education should be designed to reach the target audience. This will assist to reduce the re-occurrence, if not totally eliminate waterborne diseases in our society.
3. Furthermore, incorporation of real rural/urban safe water policy; a departure from the current practice where money is allocated for provision of safe water, without water. Over the time, large sum of money are allocated to water and sanitation, without corresponding realities on ground.

The implication is that, for as long as this scenario is allowed to continue, Nigeria will continue to receive back lash of adverse effects of waterborne diseases. Nigeria has not been able to meet the MDGs in provision of safe water and sanitation. Kwara State is lagging behind and this may explain why waterborne diseases are still around in the state.

4. There are many unreported cases of waterborne diseases and other diseases in the state, part of which can be blamed on uneven distribution of public health facilities in the state. Where these facilities are available, personnel may not and vice versa. Participatory approach should be encouraged, particularly where public facilities are not adequate. Where participatory approach is place, it should be strengthened further.

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APPENDIX 1

QUESTIONNAIRE

DEPARTMENT OF GEOGRAPHY

AHMADU BELLO UNIVERSITY

ZARIA, NIGERIA.

Dear Respondent,

This questionnaire is designed to obtain information on a research work titled, “Spatio-Temporal Analysis of Waterborne Diseases in Kwara State”, being a Ph.D. research work in the above named University.

Please, be assured that all information provided will be treated in confidence and used only for this research.

Senatorial District:

Local Government Area /Code:

Administrative District:

Settlement Code:

Thank you.

Section A: Biodata

1. Sex: (a) Male [] (b) Female []
2. Age as at last birthday: (a) 15 [] (b) 15-19 [] (c) 20-24 [] (d) 25-29 [] (e) 30-34 [] (f) 65 and above []
3. Marital Status : (a) Never married [] (b) Married [] (c) Widowed [] (d) Divorced [] (e) Separated []
4. Types of marital union: (a) Polygamous [] (b) Monogamous []
5. If polygamous, how many wives do you have? (For men only)
(a) 2 [] (b) 3 [] (c) 4 [] (d) 5 and above []
6. If polygamous, how many of you are married to your husband? (For women only). (a) 2 [] (b) 3 [] (c) 4 [] (d) 5 and above []
7. Headship of households (a) Man [] (b) Women []
8. Level of educational attainment: (a) None [] (b) Quranic [] (c) Primary [] (d) Secondary [] (e) Tertiary [] (f) Others (Specify) _____
9. Types of occupation: (a) Civil/Public servant [] (b) Business Executive [] (c) Petty Trader [] (d) Farmer [] (e) Professional/Non-professional [] (f) Full housewife [] (g) Artesian/Casual labourer [] (h) Unemployed [] (i) Others (Specify) _____
10. Children ever born: (a) None [] (b) 1-2 [] (c) 3-4 [] (d) 5-6 [] (e) 7-8 [] (f) 9 and above []
11. Children Surviving: (a) None [] (b) 1-2 [] (c) 3-4 [] (d) 5-6 [] (e) 7-8 [] (f) 9 and above []
12. Income per month: (a) 5,000 [] (b) 5,000-10,000 [] (c) 10,000-20,000 [] (d) 20,000-40,000 [] (e) 40,000 and above []
13. Types of accommodation: (a) Flat [] (b) Room by room [] (c) Duplex []
14. Ownership of accommodation: (a) Private [] (b) Rentage []

Section B: Knowledge of Waterborne Diseases.

16. What are the sources of Water in your area? (a) Rain [] (b) Well [] (c) River/Stream [] (d) Bore hole [] (e) Water Vendor [] (f) Pipe borne []

15. Are you aware of the presence of diseases linked to water, which are also known as waterborne diseases in your area?
- (a) Yes [] (b) No []
16. How can you describe waterborne diseases?
- (a) Diseases resulting from dirty environment [] (b) diseases emerging as a result of contact with contaminated water [] (c) diseases emerging as a result of drinking contaminated water [] (d) all of the above [] (e) none of the above [].
18. Which of the following waterborne diseases is most common in your area?
- (a) Dysentery [] (b) Cholera [] (c) Typhoid [] (d) Guinea worm [] (e) Others (specify) _____
19. Which of the diseases identified in question 16 has affected members of your household? (a) Dysentery [] (b) Cholera [] (c) Typhoid [] (d) Guinea worm [] (e) All of the above [] (f) none of the above []
20. How long have you noticed these disease(s) in your house/area?
- (a) 5 years [] (b) 10 years [] (c) 20 years [] (d) 30 years and above []
21. How long does it take to get cured?
- (a) 1 week [] (b) 2 weeks [] (c) 1 month [] (d) 6 months []
22. Which of the following is most likely the cause of waterborne diseases?
- (a) contact with contaminated water [] (b) drinking of contaminated water [] (c) dirty environment [] (d) all of the above [] (e) none of the above []
23. When are waterborne diseases common? (a) raining season [] dry season [] (c) In between the season []
24. What steps are being taken to address these diseases?
- (a) visit to the hospital [] (b) self-medication [] (c) none of the above [] (d) all of a and b []
25. What steps are being taken by the community to tackle these diseases? (a) encouragement to visit the hospital [] (b) enlightenment [] (c) Boring of shallow wells [] (d) all of the above [] (e) none of the above []
26. How would you assess the steps taken to address the menace of these diseases? (a) positive [] (b) negative []

Section C: Socio-Economic Effects

27. How would you assess the effects of waterborne diseases?
(a) Positive [] (b) Negative []
28. If your answer to question 24 is negative, what effects has waterborne diseases on your occupation?
(a) Loss of working hour [] (b) Incapacitation [] (c) General economic loss [] (d) Drop out from school [] (e) All of the above [] (f) None of the above []

Section D: Health Care Providers only

DESIGNATION:.....

29. How rampant is waterborne diseases?
(a) Very rampant [] (b) rampant [] (c) non-rampant [] (d) Can't say []
30. What are the likely causes of waterborne diseases? (a) apathy of government in providing potable water [] (b) high level of illiteracy []
(c) inadequate purchasing power [] (d) all of the above []
(d) None of the above []
31. What are the waterborne diseases that are reported at your medical centre?
(a) Dysentery [] (b) cholera [] (c) typhoid [] (d) guinea worm [] (e) All of the above [] (f) None of the above []
32. What is the age range of people who are mostly affected by these waterborne diseases?
(a) < 5years [] (b) 5 - 14 years [] (c) 15-40years [] (d) 40 – 64 years [] (e) 65 years and above []
33. How high is the fatality among the adults?
(a) Very high [] (b) High [] (c) Not high [] (d) Not at all []
34. How high is the fatality among the Children less than 5 years old?
(a) Very high [] (b) High [] (c) Not high [] (d) Not at all []
35. Do you know any programme of government aimed at reducing cases of waterborne diseases in your area? (a) Yes [] (b) No []

APPENDIX 2

Table 4.7: Results of Crosstabulation between Water Borne Diseases and Sex

SEX	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
Male	108(16.2%)	105(15.8%)	104(15.7%)	105(15.8%)	91(13.7%)	87(13.1%)	600(90.4%)
Female	9(1.4%)	11(1.6%)	9(1.4%)	11(1.6%)	14(2.1%)	10(1.5%)	64(9.6%)
TOTAL	117(17.6%)	116(17.5%)	113(17.0%)	116(17.5%)	105(15.8%)	97(14.6%)	664(100.0%)

Key

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

Table 4.8: Results of Crosstabulation between Water Borne Diseases and Age

AGE(YEAR)	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
20-24	0(0%)	1(0.7%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	5(0.7%)
25-29	1(0.7%)	1(0.7%)	0(0%)	0(0%)	1(0.7%)	1(0.7%)	4 (0.6 %)
30-34	3(0.4%)	4(0.6%)	2(0.3%)	4(0.6%)	4(0.6%)	3(0.4%)	20(31.6%)
35-39	6(0.9%)	4(0.6%)	4(0.6%)	5(0.7%)	5(0.7%)	6(0.9%)	30(4.5%)
40-44	16(2.4%)	11(1.7%)	9(1.4%)	12(1.8%)	15(2.3%)	17(2.6%)	80(12.0%)
45-49	25(3.8%)	28(4.2%)	21(3.1)	39(5.8%)	23(3.4%)	16(2.4%)	152(22.9%)
50-54	35(5.2%)	40(6.0%)	27(4.0%)	42(6.3%)	16(2.4%)	40(6.0%)	200(30.1%)
55-59	14(2.1%)	15(2.2%)	19(2.8%)	5(0.7%)	19(2.8%)	18(2.7%)	90(13.5%)
60-64	7(1.1%)	5(0.7%)	5(0.7%)	5(0.7%)	15(2.2%)	8(1.2%)	45(6.7%)
60and above	8(1.2%)	6(0.9%)	3(0.4%)	3(0.4%)	8(1.2%)	10(1.5%)	38(5.7%)
TOTAL	115(17.3%)	115(17.3%)	91(13.7%)	116(17.4%)	107(16.1%)	120(18.0%)	664(100.0%)

Key

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

Table 4.9: Results of Crosstabulation between Water Borne Diseases and Income

INCOME (₦)	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
Less than 5000	64(9.6%)	59(8.8%)	57(8.5%)	66(9.9%)	67(10.0%)	65(9.7%)	378(56.9%)
5000-10000	18(2.7%)	23(3.4%)	26(3.9%)	23(3.4%)	21(3.1%)	22(2.3%)	133(20.0 %)
11000-16000	11(1.6%)	9(1.3%)	14(2.1%)	12(1.8%)	10(1.5%)	12(1.8%)	68(10.2%)
17000-22000	11(1.6%)	12(1.8%)	6(0.9%)	6(0.9%)	6(0.9%)	11(1.6%)	52(7.8%)
2300 and above	4(0.6%)	5(0.7%)	7(1.1%)	6(0.9%)	6(0.9%)	5(0.7%)	33(4.9%)
TOTAL	108(16.2%)	108(16.2%)	110(16.6%)	113(17.0%)	110(16.6%)	115(17.3%)	664(100. %)

Key

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

Table 4.10: Results of Crosstabulation between Water Borne Diseases and

Education Attainment

EDUCATION	CH	DI	SCHIO	TRY	TYP	ON	TOTAL
Non-Formal/Adult Edu	8(1.2%)	6(0.9%)	7(1.1%)	11(1.6%)	8(1.2%)	13(1.9%)	53(7.9%)
Islamic	6(0.9%)	6(0.9%)	10(1.5%)	7(1.0%)	8(1.2%)	5(0.7%)	150(22.5%)
Primary	5(0.7%)	4(0.6%)	5(0.7%)	6(0.9%)	3(0.4%)	4(0.6%)	27(4.0%)
Secondary	17(2.5%)	14(2.1%)	14(2.1%)	24(3.6%)	17(2.5%)	16(2.4)	102(15.3%)
Tertiary	14(2.1%)	15(2.2%)	13(1.9%)	15(2.2%)	19(2.8%)	15(2.2%)	91(13.7%)
No educational Background	39(5.8%)	44(6.6%)	35(5.2%)	30(4.5%)	35(5.2%)	34(5.1%)	217(32.6%)
TOTAL	107(16.1%)	117(17.6%)	107(16.1. %)	116(17.4%)	116(17.4%)	101(15%)	664(100)

Key

CH	CHOLERA	TYP	TYPHOID
DI	DIARRHEA	ON	ONCHOCERCIASIS
SCHIO	SCHISTOSOMIASIS	TRY	TRYPANOSOMIASIS

APPENDIX 3

Table 5.1: t-test result of Water Borne Diseases and Sex.

<i>Demographic Information</i>	<i>Variables</i>	Mean	S.D	t _{cal}	d.f	F _{critical}	P- value	DECISION
Sex	Male							
	Female	1.8125	0.597	3.673	1328	1.96	0.0341	Rejected

APPENDIX 4

<i>Demographic Information</i>	<i>Variables</i>	Mean	S.D	F _{cal}	d.f	F _{critical}	P- value	DECISION
Age	25 – 34 years							
	35 – 44 years							
	45 – 54 years	2.8875	0.076	4.765	4,659	2.6189	0.0356	Rejected
	55 – 64 years							
	Above 65 years							
Income	Less than N5,000							
	N5,000 – N10,000							
	N11,000 – N16,000	3.793	0.022	10.86	4, 659	2.6189	0.0011	Rejected
	N17,000 – N22,000							
	Above N23,000							
Educational qualification	Non-formal Education							
	Islamic Education							
	Primary Education	3.9321	0.143	7.211	5, 659	2.6189	0.004	Rejected
	Secondary Education							
	Tertiary Education							
No educational background								

APPENDIX 5.

Table 5.2: Descriptive Statistics of the Perception on the Prevalence of the Six Diseases across the Three Senatorial Districts of the Study Area

Senatorial district	N	Minimum	Maximum	Mean	Std. Deviation
Kwara North	24	60.00	400.00	175.75	90.09572
Kwara Central	24	60.00	260.00	155.58	59.12692
Kwara South	24	60.00	450.00	186.17	89.16066

APPENDIX 6

Table 5.3: ANOVA Result of the Perception on the Prevalence of the Six Disease across the Three Senatorial Districts of the Study Area.

<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	62.1471	2	31.07355	19.9561	0.000	2.22634
Within Groups	1029.239	661	1.557095			
Total	1091.387	663				

Remark: $F_{cal} = 19.9$ and $f_{0.05, 2, 661} = 2.22$, since $f_{cal} > f_{0.05, 2, 661}$ and $p - value = 0.00 < 0.05$, the null hypothesis is rejected.

APPENDIX 7

Table 5.4.: The Result of Correlation Analysis on Prevalence of Waterborne Diseases in Kwara North senatorial District.

		Prevalence of WBDS
Kwara North	Pearson Correlation	.530**
	Sig. (2-tailed)	.008
	Df	22

****.** Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 8

Table 5.5: The Result of Correlation Analysis on Prevalence WBDs in Kwara Central senatorial District.

Kwara Central	Pearson Correlation	.199
	Sig. (2-tailed)	.352
	Df	22

APPENDIX 9

Table 5.6: The Result of Correlation Analysis on Prevalence in Kwara South Senatorial District.

Kwara South	Pearson Correlation	.275
	Sig. (2-tailed)	.194
	N	24

APPENDIX 10

FOCUS GROUP DISCUSSION QUESTIONNAIRE

1. Do you have any children?

Yes No Reject
2. Name:
3. Age :
4. Status in the family
5. Marital Status
6. Number of members of your house hold
7. Educational Level
8. Occupation
9. Number of years of residence in village/town
10. What do you know about waterborne disease?
11. Can you name waterborne diseases in your area?
12. Which is more prevalent?
13. What are the likely causes of the named waterborne diseases in item 12?
.....
14. How are the challenges from waterborne disease being tackled?
.....
15. What are the likely effects of waterborne diseases that you can speak on.

APPENDIX 11

Table 3.2: Stratification of the Study Area by Senatorial Districts and LGs.

Senatorial Districts	LGAs	District	LGAs	District
Kwara North	Moro	Oloru Ejidongari	Kaiama	Ilorin East
		Lanwa Ipaiye Malete		
Kwara central	Asa	Afon	Ilorin East	Iponrin
		Onire		Magaji-Are
		Owode Share		Balogun, Gambari, Ibagun, Sango
Kwara South	Ifelodun	Igbaja	Oke-Ero	Iloffo/ Odo-Owa
				Idofin
		Oke-Ode Idofian Omupo Oro-Ago Ile-Ere	Ekani	

APPENDIX 12.

Table 3.3: Sampled households and Distribution of Questionnaire in the Study Area.

SENATORIAL	Districts	Number of Settlements	Sampled Settlements(SS)	Estimated Household= (SS × Mean HH (4.7*))	Number of Questionnaire
KWARA NORTH	Oloru	46	5	24	45
	Ejidongari	30	3	14	27
	Lanwa	85	9	42	79
	Ipaiye	11	1	5	9
	Malete	12	1	5	9
	Kaiama	63	6	28	53
	Total		247	25	118
KWARA CENTRAL	Afon	72	7	33	62
	Onire	20	2	9	17
	Owode	50	5	24	45
	Iponrin	60	6	28	53
	Magaji-Are	15	2	9	17
	Balogun/Gambari/Ibagun/Sa ngo	10	1	5	9
	Total		227	23	108
KWARA SOUTH	Share	23	2	9	17
	Igbaja	17	2	9	17
	Oke-Ode	20	2	9	17
	Idofian	11	1	5	9
	Omupo	20	2	9	17
	Oro-Ago	9	1	5	9
	Agunjin	13	1	5	9
	Ora	11	1	5	9
	Ile-Ere	12	1	5	9
	Iloffa/Odo-Owa	40	4	19	36
	Idofin	40	4	19	36
	Ekan	60	6	28	54
	Total		276	27	127
Grand Total		750	75		664

Source: National Population Commission (1991). (*Estimated mean of number of HH)

APPENDIX 13

LISTS OF SAMPLED SETTLEMENT PER DISTRICT IN THE STUDY AREA.

Thus, for Oloru district, five settlements--(1) Ara, (2)Adama, (3)Asomu, (4) Pakumo and (5)Elemere.

In Ejidongari district, three Settlements were selected and these are (1)Fala.(2)Amu and (3)Okutala

For Lanwa district nine settlements were sampled:- (1)Bode-Saadu, (2)Biribiri,(3)Lanwa-Oko, (4)Olowode, (5)Adio, (6)Ekejo II, (7) Bako, (8)Ganbe -Tukur, and (9)Elemosho.

In Ipaiye district 1 settlement was selected- (1)Maso

Malete district had 1 settlement—Idi-Agano.

For Kaiama district Gate, Venra, Tunga-Maje,Kanko and Kugij, Alasapa are sampled settlements.

In same vein, Afon district has seven sampled settlements-(1) Pandoro & Others, (2)Ladere-(3)Magaj,(4)Alagbon, (5)Afon, (6)Olomoda and (7)Onifufu.

For Onire district, two settlements were sampled- (1)Budo-Alhaji, and (2)Pasa

In Owode district five settlements were sampled and these are: (1)Owode, (2)Ola-Omin, (3)Ogbena, (4)Elega and (5)Ojugbede.

Similarly, in Iponrin district six settlements were sampled-(1)Alalubosa and Other, (2)Gbadamu and Others, (3)Budo–Oyo, (4)Matanmi and Others,(5)Maya and (6)Odundaaku.

While in Magaji-Are district two settlements were sampled-(1)Ologii and (2)Oke-Ose

In Balogun/Gambari/Ibagun/Sango district. (1)Sentu is the only sampled settlement..

In Share district,(1) Alegongo- Temidire and (2) Arobaiye were sampled.

In Igbaja district, two settlements were sampled and these are: - (1)Eleyele and Others and (2) Labaka-Oja are also sampled

In Oke-Ode district, two settlements were equally sampled –(1)Ikosin and (2)Oroki.

Idofian district 1 settlement is sampled (1)Falokun is sampled.

While in Omupo district, two settlements were sampled – (1) Alaka and (2)Obaloyan were selected.

In Oro-Ago district, a settlement was sampled-(1)Irabon is sampled.

In Agunjin district, a settlement was sample- (1)Magbon

For Ora district, a settlement was sampled-(1) Wande.

In Ile-Ere district, a settlement was sampled- (1)Afin-Ile-Ere.

For Iloffa/Odo-Owa district, four settlements were sampled- (1)Gaa-Eju, (2)Iloffa, (3)Ilale and (4)Erinmope

While In Idofin district, four settlements were sampled-(1) Idofin-Igbana, (2) Idofin-Odoaga, (3) Idofin-Ehinafo and (4) Idofin Aiyekale.

Lastly, in Ekan district six settlements were sampled – (1) Aiyedun, (2) Ilale,(3)Iloffa,(4)Ekan,(5) Ilale and (6) Gaa Ilofa.